STIC Search Report
EIC 1700

Scientific & Technical Information Center
USPTO

STIC Database Tracking Number: 101203

TO: Angela Martin
Location: CP3 8A05
Art Unit : 1745
August 19, 2003

Case Serial Number: 09/995457

From: John Calve
Location: EIC 1700
CP3/4-3D62
Phone: 308-4139

John.Calve@uspto.gov

Search Notes

sira
Search and Information Resources Administration

Access DB# 101203

SEARCH REQUEST FORM

Scientific and Technical Information Center

Requester's Full Name: Angela J Martin Examiner # : 76027 Date: 8/13/03
Art Unit: 1745 Phone Number 305-0586 Serial Number: 09/995457
Mail Box and Bldg/Room Location: CP3-8A05 Results Format Preferred (circle): PAPER DISK E-MAIL

If more than one s arch is submitt d, please prioritize searches in order of need.

****

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: Metal Hydride Battery Material w/ High Storage Capacity

Inventors (please provide full names): *File Page Attached

Earliest Priority Filing Date: 11/27/01; Foreign 11/27/00

***For Sequence Searches Only* Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.**

* claims 1, 7, 10 only

2002012?981

Spoke with examiner

****

STAFF USE ONLY

Searcher: JC	**Type of Search**	**Vendors and cost where applicable**
Searcher Phone #:	NA Sequence (#)	STN
Searcher Location:	AA Sequence (#)	Dialog
Date Searcher Picked Up: 8/19/03	Structure (#)	Questel/Orbit
Date Completed: 8/19/03	Bibliographic	Dr.Link
Searcher Prep & Review Time: 120	Litigation	Lexis/Nexis
Clerical Prep Time:	Fulltext	Sequence Systems
Online Time: 60	Patent Family	WWW/Internet
	Other	Other (specify)

PTO-1590 (8-01)

STIC Search Results Feedback Form

EIC17000

Questions about the scope or the results of the search? Contact ***the EIC searcher or contact***:

Kathleen Fuller, EIC 1700 Team Leader
308-4290, CP3/4-3D62

Voluntary Results Feedback Form

- *I am an examiner in Workgroup:* ☐ *Example: 1713*
- *Relevant prior art **found**, search results used as follows:*
  - ☐ 102 rejection
  - ☐ 103 rejection
  - ☐ Cited as being of interest.
  - ☐ Helped examiner better understand the invention.
  - ☐ Helped examiner better understand the state of the art in their technology.

  Types of relevant prior art found:
  - ☐ Foreign Patent(s)
  - ☐ Non-Patent Literature
    (journal articles, conference proceedings, new product announcements etc.)

- *Relevant prior art **not found:***
  - ☐ Results verified the lack of relevant prior art (helped determine patentability).
  - ☐ Results were not useful in determining patentability or understanding the invention.

Comments:

Drop off or send completed forms to STIC/EIC1700 CP3/4 3D62

```
=> file hca
FILE 'HCA' ENTERED AT 09:22:06 ON 19 AUG 2003
USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.
PLEASE SEE "HELP USAGETERMS" FOR DETAILS.
COPYRIGHT (C) 2003 AMERICAN CHEMICAL SOCIETY (ACS)
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FILE COVERS 1907 - 14 Aug 2003 VOL 139 ISS 8
FILE LAST UPDATED: 14 Aug 2003  (20030814/ED)

  This file contains CAS Registry Numbers for easy and accurate
  substance identification.


=> d his

     (FILE 'HOME' ENTERED AT 08:43:37 ON 19 AUG 2003)

     FILE 'HCA' ENTERED AT 08:43:43 ON 19 AUG 2003
                E US20020122981/PN
L1            1 S E3
                SEL L1 RN

     FILE 'REGISTRY' ENTERED AT 08:44:03 ON 19 AUG 2003
L2           15 S E1-E15
L3            7 S L2 AND AYS/CI
L4            8 S L2 NOT L3

     FILE 'HCA' ENTERED AT 08:45:44 ON 19 AUG 2003
                S L4 AND TIS/CI

     FILE 'REGISTRY' ENTERED AT 08:47:46 ON 19 AUG 2003
L5       405880 S TIS/CI

     FILE 'HCA' ENTERED AT 08:47:47 ON 19 AUG 2003

     FILE 'REGISTRY' ENTERED AT 08:47:57 ON 19 AUG 2003
L6            1 S L4 AND TIS/CI
L7            1 S L4 AND HYDROGEN?/CNS
L8            7 S L4 NOT L6
L9            6 S L8 NOT L7

     FILE 'LREGISTRY' ENTERED AT 08:48:49 ON 19 AUG 2003

     FILE 'HCA' ENTERED AT 08:50:20 ON 19 AUG 2003
L10          24 S L3
L11           3 S L6
L12      747988 S L4
L13      505505 S L9
L14           8 S L10 AND L12 AND L13
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L15        7069 S (HYDROGEN# OR H2)(2N)(STOR?)
L16           1 S L10 AND L15
L17         733 S L13 AND L15
L18      231579 S 52/SX,SC
L19         560 S L17 AND L18
L20           1 S L19 AND L10
L21         207 S L19 AND HYDRIDE?

     FILE 'REGISTRY' ENTERED AT 08:55:24 ON 19 AUG 2003
L22        1588 S 5-90/MG
L23      123001 S 0-100/MG
L24       11620 S 0-100/SC
L25       54201 S 0-100/Y
L26       61455 S 0-100/LA
L27        7436 S L23 AND (L24 OR L25 OR L26)
L28         174 S L27 AND 1-99/H

     FILE 'HCA' ENTERED AT 08:58:21 ON 19 AUG 2003
L29         914 S L28
L30           6 S L29 AND L15

     FILE 'REGISTRY' ENTERED AT 08:59:41 ON 19 AUG 2003
L31          26 S L23 AND L24 AND 1-99/H
L32           9 S L31 AND 3-4/NC

     FILE 'HCA' ENTERED AT 09:00:51 ON 19 AUG 2003
L33           7 S L32

     FILE 'REGISTRY' ENTERED AT 09:01:21 ON 19 AUG 2003
L34      765779 S AYS/CI
L35      405880 S TIS/CI
L36          67 S L28 AND L35
L37          87 S L28 AND (L35 OR L34)
L38           5 S L32 AND (L35 OR L34)

     FILE 'HCA' ENTERED AT 09:02:45 ON 19 AUG 2003
L39         622 S L37
L40           4 S L38
L41           6 S L39 AND L15
L42           2 S L40 AND L15
L43           6 S L41 OR L42
L44           2 S L43 AND L9
L45           6 S L43 AND L4
L46           6 S L44 OR L45
L47           6 S L46 AND 1907-2000/PY,PRY

     FILE 'LREGISTRY' ENTERED AT 09:05:14 ON 19 AUG 2003

     FILE 'REGISTRY' ENTERED AT 09:08:23 ON 19 AUG 2003
L48       36041 S 1-99 MG/MAC
L49       58160 S 0-100 MG/MAC
L50       10573 S 0-100 Y/MAC
L51       10043 S 0-100 LA/MAC
L52        2283 S 0-100 SC/MAC
L53        3060 S L49 AND (L50 OR L51 OR L52)
L54        1627 S L53 AND 3-5/NC

     FILE 'HCA' ENTERED AT 09:10:18 ON 19 AUG 2003
L55        1699 S L53
L56        1011 S L54
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search for compounds - Mg + (Sc/Y/La) + (H2) = in one record.

Search for alloys <u>without</u> the hydrogen
Hydrogen is indexed as separate element.

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L57     1130741 S STOR? OR ACCUMULAT? OR COLLECT? OR SAVE## OR SAVING## OR SAVE
L58        8201 S L57(2N)(HYDROGEN# OR H2)
L59          79 S L55 AND L58
L60          68 S L56 AND L58
L61          68 S L56 AND L15
L62          79 S L55 AND L15
L63             QUE (L7 OR HYDROGEN## OR H2)
L64      103197 S HYDRID?
L65          68 S L61 AND L63
L66          42 S L65 AND L64
L67      498044 S PD OR PALLADIUM# OR PT OR PLATINUM# OR RHODIUM# OR RH

     FILE 'REGISTRY' ENTERED AT 09:14:43 ON 19 AUG 2003
L68           3 S L9 AND (PLATINUM# OR PALLADIUM# OR RHODIUM##)/CNS

     FILE 'HCA' ENTERED AT 09:15:30 ON 19 AUG 2003
L69      177217 S L68
L70      502254 S L67 OR L69
L71           3 S L66 AND L70
L72           5 S L65 AND L70
L73           6 S L59 AND L70
L74           6 S L71 OR L72 OR L73
L75     1321647 S CATALY? OR ACTIVATOR? OR ACCELERANT? OR ENHANCER? OR ACCELERA
L76           3 S L74 AND L75
L77           6 S L74 OR L76
L78      790562 S ANOD? OR CATHOD? OR ELECTROD?
L79           2 S L77 AND L78
L80           6 S L77 OR L79
L81          41 S L66 AND L18
L82          33 S L81 AND 1907-2000/PRY,PY
L83     1446830 S MAGNESIUM# OR MG
L84          32 S L82 AND L83
L85          33 S L82 OR L84
L86          31 S L85 NOT L47

     FILE 'HCA' ENTERED AT 09:22:06 ON 19 AUG 2003

=> d L47 1-7 cbib abs hitind hitstr
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(AUTHOR'S RECORD)

L47 ANSWER 1 OF 6 HCA

136:388551 Metal hydride battery material with high storage capacity. Ouwerkerk, Martin; Janner, Anna-Maria; Notten, Petrus H. L. (Koninklijke Philips Electronics N.V., Neth.). PCT Int. Appl. WO 2002043170 A2 20020530, 7 pp. DESIGNATED STATES: W: CN, JP; RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2001-EP13409 20011119. PRIORITY: EP 2000-204211 20001127.

AB Disclosed is a **hydrogen storage** material comprising a magnesium-contg. intermetallic compd. which can form a hydride with hydrogen. The intermetallic compd. comprises an alloy of magnesium and a trivalent metal selected from the group of Sc, Y, La and the rare earth elements. Preferably, the intermetallic compd. comprises a scandium-magnesium alloy. In an advantageous embodiment, the **hydrogen storage** material also comprises a catalytically active material. Furthermore, an electrochem. active material, as well as an electrochem. cell comprising the above **hydrogen storage** material are disclosed.

IC ICM H01M004-38
   ICS C22C023-00

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 56
IT **7439-88-5**, Iridium, uses **7440-02-0**, Nickel, uses
7440-05-3, Palladium, uses **7440-06-4**, Platinum, uses
7440-16-6, Rhodium, uses **7440-48-4**, Cobalt, uses
RL: CAT (Catalyst use); USES (Uses)
(metal hydride battery material with high storage capacity)
IT **404965-31-7**, Magnesium scandium hydride
RL: FMU (Formation, unclassified); TEM (Technical or engineered material use); FORM (Formation, nonpreparative); USES (Uses)
(metal hydride battery material with high storage capacity)
IT **1333-74-0**, Hydrogen, uses
RL: PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(metal hydride battery material with high storage capacity)
IT **7439-88-5**, Iridium, uses **7440-02-0**, Nickel, uses
7440-05-3, Palladium, uses **7440-06-4**, Platinum, uses
7440-16-6, Rhodium, uses **7440-48-4**, Cobalt, uses
RL: CAT (Catalyst use); USES (Uses)
(metal hydride battery material with high storage capacity)
RN 7439-88-5 HCA
CN Iridium (8CI, 9CI) (CA INDEX NAME)

Ir

RN 7440-02-0 HCA
CN Nickel (8CI, 9CI) (CA INDEX NAME)

Ni

RN 7440-05-3 HCA
CN Palladium (8CI, 9CI) (CA INDEX NAME)

Pd

RN 7440-06-4 HCA
CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

RN 7440-16-6 HCA
CN Rhodium (8CI, 9CI) (CA INDEX NAME)

Rh

RN 7440-48-4 HCA
CN Cobalt (8CI, 9CI) (CA INDEX NAME)

Co

IT **404965-31-7**, Magnesium scandium hydride
RL: FMU (Formation, unclassified); TEM (Technical or engineered material use); FORM (Formation, nonpreparative); USES (Uses)
(metal hydride battery material with high storage capacity)
RN 404965-31-7 HCA

CN Magnesium scandium hydride (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
H	x	12385-13-6
Sc	x	7440-20-2
Mg	x	7439-95-4

IT **1333-74-0**, Hydrogen, uses
RL: PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(metal hydride battery material with high storage capacity)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H— H

L47 ANSWER 2 OF 6 HCA COPYRIGHT 2003 ACS on STN
136:270283 Light-switching device. Johnson, Mark Thomas; Van der Sluis, Paul; Janner, Anna-Maria; Cornelissen, Hugo Johan (Koninklijke Philips Electronics N.V., Neth.). U.S. Pat. Appl. Publ. US 20020036816 A1 20020328, 6 pp. (English). CODEN: USXXCO. APPLICATION: US 2001-965415 20010927. PRIORITY: EP 2000-203378 20000928.
AB Devices which are reversibly switchable between at least a first state of reflecting light and a second state of absorbing light are described which comprise a stack of layers including a switchable layer of an optically switchable material which brings about a switch from the first state to the second state of the device by changing a d. of hydrogen, the stack further including a layer for **storing hydrogen** which comprises a material comprising essentially the same compds. as the switchable layer. Display devices in which pixels are formed from the switchable elements are also described. The optically switchable material may comprise LMgHx (L= Ni, Sc, Y, or a lanthanide).
IC ICM G02F001-03
ICS G02F001-07; G02F001-153
NCL 359245000
CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
Section cross-reference(s): 72, 74
IT **1333-74-0**, Hydrogen, processes
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(electrochromic mirrors using hydrogen switching and displays using them)
IT 67016-28-8, Magnesium nickel hydride **72870-44-1**, Magnesium yttrium hydride 231619-60-6, Gadolinium magnesium hydride **404965-31-7**, Magnesium scandium hydride
RL: DEV (Device component use); USES (Uses)
(electrochromic mirrors using hydrogen switching and displays using them)
IT **1333-74-0**, Hydrogen, processes
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(electrochromic mirrors using hydrogen switching and displays using them)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H— H

IT **72870-44-1**, Magnesium yttrium hydride **404965-31-7**,
Magnesium scandium hydride
RL: DEV (Device component use); USES (Uses)
(electrochromic mirrors using hydrogen switching and displays using them)
RN 72870-44-1 HCA
CN Magnesium yttrium hydride (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
H	x	12385-13-6
Y	x	7440-65-5
Mg	x	7439-95-4

RN 404965-31-7 HCA
CN Magnesium scandium hydride (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
H	x	12385-13-6
Sc	x	7440-20-2
Mg	x	7439-95-4

L47 ANSWER 3 OF 6 HCA COPYRIGHT 2003 ACS on STN
132:350203 **Hydrogen storage** alloys with PuNi3-type structure as metal hydride electrodes. Chen, J.; Kuriyama, N.; Takeshita, H. T.; Tanaka, H.; Sakai, T.; Haruta, M. (Osaka National Research Institute, Osaka, 563-8577, Japan). Electrochemical and Solid-State Letters, 3(6), 249-252 (English) **2000**. CODEN: ESLEF6. ISSN: 1099-0062. Publisher: Electrochemical Society.
AB A powder sintering method was used to synthesize the intermetallic compds. LaCaMgNi9, CaTiMgNi9, LaCaMgNi6Al3, and LaCaMgNi6Mn3 (PuNi3-type). The microstructure and primary phases were obsd. by SEM and X-ray diffraction. The pressure-compn. isotherms showed that all alloys could reversibly absorb and desorb up to 1.8 wt% hydrogen at 20.degree. and a hydrogen pressure of 3.3 MPa. The sintered samples were employed as the active materials of metal hydride electrodes. The hydride stability and electrochem. performance, combined with low cost raw materials, make these compds. attractive for metal hydride electrodes.
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56
ST battery anode **hydrogen storage** alloy; intermetallic compd **hydrogen storage** battery anode
IT Intermetallic compounds
Intermetallic compounds
RL: FMU (Formation, unclassified); FORM (Formation, nonpreparative)
(hydrides; **hydrogen storage** alloys with PuNi3-type structure as metal hydride electrodes)
IT Entropy
(hydriding; **hydrogen storage** alloys with PuNi3-type structure as metal hydride electrodes)
IT Absorption enthalpy
Absorption kinetics

Battery anodes
Desorption
Desorption kinetics
Hydriding
Microstructure
Phase
(**hydrogen storage** alloys with PuNi3-type structure as metal hydride electrodes)

IT Intermetallic compounds
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(**hydrogen storage** alloys with PuNi3-type structure as metal hydride electrodes)

IT Hydrides
Hydrides
RL: FMU (Formation, unclassified); FORM (Formation, nonpreparative)
(intermetallic; **hydrogen storage** alloys with PuNi3-type structure as metal hydride electrodes)

IT Sintering
(powder; **hydrogen storage** alloys with PuNi3-type structure as metal hydride electrodes)

IT 12196-72-4 268728-50-3 268728-51-4 268728-52-5 268728-53-6
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(**hydrogen storage** alloys with PuNi3-type structure as metal hydride electrodes)

IT 54847-21-1, Lanthanum nickel hydride LaNi5H6 **268728-54-7** 268728-55-8 **268728-56-9** **268728-57-0**
RL: FMU (Formation, unclassified); FORM (Formation, nonpreparative)
(**hydrogen storage** alloys with PuNi3-type structure as metal hydride electrodes)

IT 7429-90-5, Aluminum, processes 7439-96-5, Manganese, processes **7440-02-0**, Nickel, processes 7440-32-6, Titanium, processes 12057-58-8 12213-73-9 12306-14-8 12409-69-7
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(**hydrogen storage** alloys with PuNi3-type structure as metal hydride electrodes)

IT **1333-74-0, Hydrogen**, uses
RL: PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(**hydrogen storage** alloys with PuNi3-type structure as metal hydride electrodes)

IT **268728-54-7** **268728-56-9** **268728-57-0**
RL: FMU (Formation, unclassified); FORM (Formation, nonpreparative)
(**hydrogen storage** alloys with PuNi3-type structure as metal hydride electrodes)

RN 268728-54-7 HCA
CN Calcium lanthanum magnesium nickel hydride (CaLaMgNi9H13.2) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
H ✓	13.2	12385-13-6
Ca	1	7440-70-2
Ni	9	7440-02-0
Mg ✓	1	7439-95-4
La ✓	1	7439-91-0

Angela,
Since the language for claim 1 is "comprising" & since I was getting so few hits, I didn't limit the number of components

RN 268728-56-9 HCA

CN Aluminum calcium lanthanum magnesium nickel hydride (Al3CaLaMgNi6H11.9) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
H	11.9	12385-13-6
Ca	1	7440-70-2
Ni	6	7440-02-0
Mg	1	7439-95-4
La	1	7439-91-0
Al	3	7429-90-5

RN 268728-57-0 HCA
CN Calcium lanthanum magnesium manganese nickel hydride (CaLaMgMn3Ni6H13) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
H	13	12385-13-6
Ca	1	7440-70-2
Ni	6	7440-02-0
Mn	3	7439-96-5
Mg	1	7439-95-4
La	1	7439-91-0

IT **7440-02-0**, Nickel, processes
RL: PEP (Physical, engineering or chemical process); PROC (Process) (**hydrogen storage** alloys with PuNi3-type structure as metal hydride electrodes)
RN 7440-02-0 HCA
CN Nickel (8CI, 9CI) (CA INDEX NAME)

Ni

IT **1333-74-0, Hydrogen**, uses
RL: PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses) (**hydrogen storage** alloys with PuNi3-type structure as metal hydride electrodes)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H—H

L47 ANSWER 4 OF 6 HCA COPYRIGHT 2003 ACS on STN
132:310824 Nickel-based **hydrogen storage** alloy for battery anode. Kita, Koichi; Sugawara, Katsuo; Wada, Masahiro; Murai, Takuya; Isobe, Takeshi (Mitsubishi Materials Corp., Japan). Jpn. Kokai Tokkyo Koho JP 2000129379 A2 **20000509**, 7 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1998-303779 19981026.
AB The Ni-based alloy contains La- and/or Ce-based rare earth alloy 32-38, Co 0.1-17, Al 0.1-3.5, Mn 0.5-10, H 0.005-0.2, and Ti, Zr, Hf, V, Mg, Ca, Si, Ba, and/or Y 0.1-1 wt.% and has a CaCu5-type base crystal structure phase dispersing 1-40% Ce2Ni7 phase and 1-40% hydrides of rare earth elements and active elements in an area ratio. The alloy gives battery anodes with

high-rate performance.
IC ICM C22C019-00
ICS H01M004-38
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56
ST **hydrogen storage** nickel alloy battery anode
IT Battery anodes
(nickel-based **hydrogen storage** alloy for battery anode)
IT **1333-74-0**, Hydrogen, uses 266322-09-2 266322-10-5 266322-11-6 266322-12-7 266322-13-8 266322-14-9 266322-15-0 266322-16-1 266322-17-2 **266322-18-3** 266322-19-4 266322-20-7 266322-21-8 266322-22-9 266322-23-0 266322-24-1 266322-25-2 266322-26-3 266322-27-4 266322-28-5 266322-29-6 **266322-30-9** **266322-31-0** 266322-32-1 266322-33-2 266322-34-3 266322-35-4 266322-36-5 266322-37-6 266322-38-7 266322-39-8 **266322-40-1**
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(nickel-based **hydrogen storage** alloy for battery anode)
IT **1333-74-0**, Hydrogen, uses **266322-18-3** **266322-30-9** **266322-31-0** **266322-40-1**
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(nickel-based **hydrogen storage** alloy for battery anode)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H—H

RN 266322-18-3 HCA
CN Nickel alloy, base, Ni 49,La 29,Co 11,Mn 3.9,Nd 2.4,Al 1.4,Pr 1.4,Mg 1,Ce 0.9,H 0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ni	49	7440-02-0
La	29	7439-91-0
Co	11	7440-48-4
Mn	3.9	7439-96-5
Nd	2.4	7440-00-8
Al	1.4	7429-90-5
Pr	1.4	7440-10-0
Mg	1	7439-95-4
Ce	0.9	7440-45-1
H	0.1	12385-13-6

RN 266322-30-9 HCA
CN Nickel alloy, base, Ni 44,La 22;Ce 9.2,Mn 7.5,Co 6.4,Nd 4.6,Pr 2.6,Al 2,Mg 0.9,H 0.2,V 0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ni	44	7440-02-0
La	22	7439-91-0

Ce	9.2	7440-45-1
Mn	7.5	7439-96-5
Co	6.4	7440-48-4
Nd	4.6	7440-00-8
Pr	2.6	7440-10-0
Al	2	7429-90-5
Mg	0.9	7439-95-4
H	0.2	12385-13-6
V	0.1	7440-62-2

RN 266322-31-0 HCA
CN Nickel alloy, base, Ni 43,La 30,Co 12,Mn 5.1,Nd 2.9,Ce 2.6,Pr 2.3,Al 1.8,H 0.2,Ca 0.1,Mg 0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ni	43	7440-02-0
La	30	7439-91-0
Co	12	7440-48-4
Mn	5.1	7439-96-5
Nd	2.9	7440-00-8
Ce	2.6	7440-45-1
Pr	2.3	7440-10-0
Al	1.8	7429-90-5
H	0.2	12385-13-6
Ca	0.1	7440-70-2
Mg	0.1	7439-95-4

RN 266322-40-1 HCA
CN Nickel alloy, base, Ni 46,La 14,Ce 13,Co 9.5,Mn 7.6,Nd 5.2,Pr 1.9,Al 1.5,V 0.2,Ba 0.1,Ca 0.1,H 0.1,Hf 0.1,Mg 0.1,Si 0.1,Ti 0.1,Y 0.1,Zr 0.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ni	46	7440-02-0
La	14	7439-91-0
Ce	13	7440-45-1
Co	9.5	7440-48-4
Mn	7.6	7439-96-5
Nd	5.2	7440-00-8
Pr	1.9	7440-10-0
Al	1.5	7429-90-5
V	0.2	7440-62-2
Ba	0.1	7440-39-3
Ca	0.1	7440-70-2
H	0.1	12385-13-6
Hf	0.1	7440-58-6
Mg	0.1	7439-95-4
Si	0.1	7440-21-3
Ti	0.1	7440-32-6
Y	0.1	7440-65-5
Zr	0.1	7440-67-7

L47 ANSWER 5 OF 6 HCA COPYRIGHT 2003 ACS on STN
132:310790 Structural investigation and **hydrogen storage** capacity of LaMg2Ni9 and (La0.65Ca0.35)(Mg1.32Ca0.68)Ni9 of the AB2C9 type

structure. Kadir, K.; Sakai, T.; Uehara, I. (Osaka National Research Institute, Department of Energy and Environment, Ikeda-shi, Osaka, Japan). Journal of Alloys and Compounds, 302(1-2), 112-117 (English) **2000**
. CODEN: JALCEU. ISSN: 0925-8388. Publisher: Elsevier Science S.A..

AB A new quaternary magnesium based alloy (La0.65Ca0.35)(Mg1.32Ca0.68)Ni9 and its hydride have been synthesized and their crystal structures were detd. by Guinier-Hagg X-ray powder diffraction. The compd. has a hexagonal structure and is isostructural with LaMg2Ni9 (AB2C9 type), in which Ca partially occupies both A and B sites. The hydrogen absorption/desorption properties were detd. by pressure-compn. isotherms and compared with LaMg2Ni9. (La0.65Ca0.35)(Mg1.32Ca0.68)Ni9 absorbs .apprx.1.87 wt.% H2 at .apprx.3.3 MPa H2 and 283 K.

CC 52-3 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56

ST **hydrogen storage** lanthanum calcium magnesium nickel alloy

IT Enthalpy
(desorption; structural investigation and **hydrogen storage** capacity of LaMg2Ni9 and (La0.65Ca0.35)(Mg1.32Ca0.68)Ni 9 of the AB2C9 type structure)

IT Absorption enthalpy
Crystal structure
Entropy
Hydriding
(structural investigation and **hydrogen storage** capacity of LaMg2Ni9 and (La0.65Ca0.35)(Mg1.32Ca0.68)Ni9 of the AB2C9 type structure)

IT **1333-74-0**, Hydrogen, uses
RL: PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(structural investigation and **hydrogen storage** capacity of LaMg2Ni9 and (La0.65Ca0.35)(Mg1.32Ca0.68)Ni9 of the AB2C9 type structure)

IT **266309-29-9**
RL: PRP (Properties)
(structural investigation and **hydrogen storage** capacity of LaMg2Ni9 and (La0.65Ca0.35)(Mg1.32Ca0.68)Ni9 of the AB2C9 type structure)

IT 266309-28-8
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(structural investigation and **hydrogen storage** capacity of LaMg2Ni9 and (La0.65Ca0.35)(Mg1.32Ca0.68)Ni9 of the AB2C9 type structure)

IT **1333-74-0**, Hydrogen, uses
RL: PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(structural investigation and **hydrogen storage** capacity of LaMg2Ni9 and (La0.65Ca0.35)(Mg1.32Ca0.68)Ni9 of the AB2C9 type structure)

RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H— H

IT **266309-29-9**
RL: PRP (Properties)
(structural investigation and **hydrogen storage** capacity of LaMg2Ni9 and (La0.65Ca0.35)(Mg1.32Ca0.68)Ni9 of the AB2C9

type structure)
RN 266309-29-9 HCA
CN Calcium lanthanum magnesium nickel hydride (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
H	x	12385-13-6
Ca	x	7440-70-2
Ni	x	7440-02-0
Mg	x	7439-95-4
La	x	7439-91-0

L47 ANSWER 6 OF 6 HCA COPYRIGHT 2003 ACS on STN
132:267510 Nickel-metal hydride (Ni-MH) battery using Mg2Ni-type **hydrogen storage** alloy. Cui, N.; Luo, J. L.; Chuang, K. T. (Department of Chemical and Materials Engineering, University of Alberta, Edmonton, AB, Can.). Journal of Alloys and Compounds, 302(1-2), 218-226 (English) **2000**. CODEN: JALCEU. ISSN: 0925-8388. Publisher: Elsevier Science S.A..

AB The performance of a sealed prismatic prototype Ni-MH battery having a Mg-Ni-Y-Al alloy anode was investigated. The materials were characterized using X-ray diffraction. The lab. tests run on this prototype battery as well as the single electrode was compared. The electrochem. behavior was detd. using electrochem. impedance spectroscopy. The battery has a good dischargeability, but a high self-discharge rate during storage at open-circuit state.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56

ST battery anode **hydrogen storage** alloy; magnesium nickel **hydrogen storage** alloy battery anode

IT Battery anodes
Secondary batteries
(nickel-metal hydride battery using Mg2Ni-type **hydrogen storage** alloy)

IT **263404-87-1**
RL: FMU (Formation, unclassified); FORM (Formation, nonpreparative)
(nickel-metal hydride battery using Mg2Ni-type **hydrogen storage** alloy)

IT **1333-74-0**, Hydrogen, uses 228853-81-4
RL: PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(nickel-metal hydride battery using Mg2Ni-type **hydrogen storage** alloy)

IT **263404-87-1**
RL: FMU (Formation, unclassified); FORM (Formation, nonpreparative)
(nickel-metal hydride battery using Mg2Ni-type **hydrogen storage** alloy)

RN 263404-87-1 HCA
CN Aluminum magnesium nickel yttrium hydride (Al0.08Mg1.95Ni0.92Y0.05H4) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
H	4	12385-13-6
Y	0.05	7440-65-5
Ni	0.92	7440-02-0
Mg	1.95	7439-95-4

Al | 0.08 | 7429-90-5

IT **1333-74-0**, Hydrogen, uses
RL: PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(nickel-metal hydride battery using Mg2Ni-type **hydrogen storage** alloy)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H— H

=> d L86 1-31 cbib abs hitind hitstr

L86 ANSWER 1 OF 31 HCA COPYRIGHT 2003 ACS on STN
136:234810 **Hydrogen** infrastructure based on combined bulk **hydrogen storage**/single-stage metal **hydride hydrogen** compressor using alloys. Ovshinsky, Stanford R.; Young, Rosa T.; Huang, Baoquan; Bavarian, Frarshad; Nemanich, Gene (USA). U.S. Pat. Appl. Publ. US 2002029820 A1 20020314, 29 pp., Cont.-in-part of U.S. Ser. No. 448,810. (English). CODEN: USXXCO. APPLICATION: US 2001-902320 20010710. PRIORITY: US 1999-435497 19991106; US 1999-448810 19991124.
AB A **hydrogen** transportation/distribution infrastructure system includes: a H purifn./compression subsystem which purifies and compresses H; and a H distribution subsystem which distributes H to end users. One or both of the subsystems includes a combined bulk H storage/single stage metal **hydride** H compressor comprising: (a) a pressure containment vessel having .gtoreq.1 H inlet/outlet port for transfering H into and out of the vessel, (b) a H storage alloy dispersed with the containment vessel, the alloy being in sufficient quantity to provide for bulk storage of H and the alloy having a plateau pressure of .ltoreq.500 psi at a temp. of .ltoreq.25.degree. and a plateau pressure .gtoreq.1500 psi at a temp. .ltoreq.200.degree., and (c) a thermal management system for alternately heating and cooling the H storage alloy.
IC ICM B67D005-06
ICS C22C023-00
NCL 141110000
CC **52-3** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56
ST **hydrogen** infrastructure metal **hydride** compressor; fuel cell vehicle **hydrogen** infrastructure; engine internal combustion refueling **hydrogen** infrastructure
IT Absorption
Compressors
Fuel cells
Internal combustion engines
Pressure vessels
(**hydrogen** infrastructure based on combined bulk **hydrogen storage**/single-stage metal **hydride hydrogen** compressor using alloys)
IT **Hydrides**
RL: TEM (Technical or engineered material use); USES (Uses)
(**hydrogen** infrastructure based on combined bulk **hydrogen storage**/single-stage metal **hydride hydrogen** compressor using alloys)
IT **Magnesium** alloy, base

RL: MOA (Modifier or additive use); USES (Uses)
(**hydrogen** infrastructure based on combined bulk **hydrogen storage**/single-stage metal **hydride** **hydrogen** compressor using alloys)

IT 325686-05-3 325686-06-4 **340711-50-4**
RL: MOA (Modifier or additive use); USES (Uses)
(**hydrogen** infrastructure based on combined bulk **hydrogen storage**/single-stage metal **hydride** **hydrogen** compressor using alloys)

IT **1333-74-0, Hydrogen,** uses 403498-98-6 403498-99-7 403499-00-3 403499-01-4
RL: PEP (Physical, engineering or chemical process); PYP (Physical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(**hydrogen** infrastructure based on combined bulk **hydrogen storage**/single-stage metal **hydride** **hydrogen** compressor using alloys)

IT **340711-50-4**
RL: MOA (Modifier or additive use); USES (Uses)
(**hydrogen** infrastructure based on combined bulk **hydrogen storage**/single-stage metal **hydride** **hydrogen** compressor using alloys)

RN 340711-50-4 HCA
CN Magnesium alloy, base, Mg 91,Al 5.6,misch metal 2,Ni 0.9,Y 0.5 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	91	7439-95-4
Al	5.6	7429-90-5
Misch metal	2	8049-20-5
Ni	0.9	7440-02-0
Y	0.5	7440-65-5

IT **1333-74-0, Hydrogen,** uses
RL: PEP (Physical, engineering or chemical process); PYP (Physical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(**hydrogen** infrastructure based on combined bulk **hydrogen storage**/single-stage metal **hydride** **hydrogen** compressor using alloys)

RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H— H

L86 ANSWER 2 OF 31 HCA COPYRIGHT 2003 ACS on STN
136:186729 Safe, economical transport of **hydrogen** within a **hydrided magnesium** alloy in pelletized form. Ovshinsky, Stanford R.; Young, Rosa T.; Stetson, Ned T.; Myasnikov, Vitaliy (Energy Conversion Devices, Inc., USA). PCT Int. Appl. WO 2002012118 A1 20020214, 42 pp. DESIGNATED STATES: W: AU, BR, CA, CN, IN, JP, KR, MX, NO, RU, SG, UA; RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2001-US24533 20010803. PRIORITY: US 2000-634678 20000808.

AB **Hydrogen** is safely and economically transported within a **magnesium**-based **hydrogen storage** alloy that

has been **hydrided** and compacted into highly dense pellets (d. > 0.8 g/cc) for shipment. The alloy compn. includes at least one misch metal element. The alloy particles have a size of 20-37 .mu.m.

IC ICM C01B006-04
ICS C01B006-00; C22C023-00

CC **52-3** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56

ST **hydrogen storage** transport **magnesium** alloy **hydrided** pellet; fuel **hydrogen storage** transport alloy; safety **hydrogen storage** alloy **magnesium** misch metal; compaction metallurgy **magnesium** alloy **hydrogen storage**

IT Powder metallurgy
(compaction; safe, economical transport of **hydrogen** within a **hydrided magnesium** alloy in pelletized form)

IT Fuel gases
(**hydrogen;** safe, economical transport of **hydrogen** within a **hydrided magnesium** alloy in pelletized form)

IT Pellets
(**magnesium** alloy; safe, economical transport of **hydrogen** within a **hydrided magnesium** alloy in pelletized form)

IT Transportation
(of **hydrogen;** safe, economical transport of **hydrogen** within a **hydrided magnesium** alloy in pelletized form)

IT Energy storage systems
Safety
(safe, economical transport of **hydrogen** within a **hydrided magnesium** alloy in pelletized form)

IT Rare earth alloys
RL: NUU (Other use, unclassified); USES (Uses)
(storage alloy contg.; safe, economical transport of **hydrogen** within a **hydrided magnesium** alloy in pelletized form)

IT 37353-81-4
RL: NUU (Other use, unclassified); RCT (Reactant); RACT (Reactant or reagent); USES (Uses)
(**hydrided;** safe, economical transport of **hydrogen** within a **hydrided magnesium** alloy in pelletized form)

IT 325686-05-3 325686-06-4 **340711-50-4**
RL: NUU (Other use, unclassified); RCT (Reactant); RACT (Reactant or reagent); USES (Uses)
(storage alloy; safe, economical transport of **hydrogen** within a **hydrided magnesium** alloy in pelletized form)

IT **1333-74-0, Hydrogen,** uses
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PYP (Physical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent); USES (Uses)
(**storage** of; safe, economical transport of **hydrogen** within a **hydrided magnesium** alloy in pelletized form)

IT **340711-50-4**
RL: NUU (Other use, unclassified); RCT (Reactant); RACT (Reactant or reagent); USES (Uses)
(storage alloy; safe, economical transport of **hydrogen** within a **hydrided magnesium** alloy in pelletized form)

RN 340711-50-4 HCA
CN Magnesium alloy, base, Mg 91,Al 5.6,misch metal 2,Ni 0.9,Y 0.5 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	91	7439-95-4
Al	5.6	7429-90-5
Misch metal	2	8049-20-5
Ni	0.9	7440-02-0
Y	0.5	7440-65-5

IT **1333-74-0, Hydrogen**, uses
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PYP (Physical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent); USES (Uses)
(**storage** of; safe, economical transport of **hydrogen** within a **hydrided magnesium** alloy in pelletized form)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H— H

L86 ANSWER 3 OF 31 HCA
136:72367 **Magnesium**-based **hydrogen storage** alloys having high capacity, fast kinetics, and long cycle life for automotive applications. Ovshinsky, Stanford R.; Young, Rosa T. (Energy Conversion Devices, Inc., USA). PCT Int. Appl. WO 2002002835 A1 20020110, 39 pp. DESIGNATED STATES: W: AU, BR, CA, CN, IN, JP, KR, MX, NO, RU, SG, UA; RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2001-US20229 20010625. PRIORITY: US 2000-609487 20000705.
AB **Hydrogen** propelled vehicles and fundamentally new **magnesium**-based **hydrogen storage** alloy materials which for the first time make it feasible and practical to use solid state storage and delivery of **hydrogen** to power internal combustion engine or fuel cell vehicles are disclosed. These exceptional alloys have remarkable **hydrogen storage** capacity of well over 6 wt.% coupled with extraordinary absorption kinetics such that the alloy powder absorbs 80% of its total capacity within 10 min at 300.degree. and a cycle life of at least 500 cycles without loss of capacity or kinetics.
IC ICM C22C023-00
ICS C22C023-02; C01B006-24
CC **52-3** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56
ST **magnesium** based **hydrogen storage** alloy automotive application; fuel cell automobile **magnesium** based **hydrogen storage** alloy
IT Absorption
Automobiles
Desorption
Fuel cells
Hydriding
Internal combustion engines

(**magnesium**-based **hydrogen storage** alloys
having high capacity, fast kinetics, and long cycle life for automotive
applications)

IT Waste heat
(utilization; **magnesium**-based **hydrogen**
storage alloys having high capacity, fast kinetics, and long
cycle life for automotive applications)

IT **1333-74-0, Hydrogen**, uses
RL: CPS (Chemical process); PEP (Physical, engineering or chemical
process); PYP (Physical process); TEM (Technical or engineered material
use); PROC (Process); USES (Uses)
(**magnesium**-based **hydrogen storage** alloys
having high capacity, fast kinetics, and long cycle life for automotive
applications)

IT 325686-05-3 325686-06-4 **340711-50-4**
RL: TEM (Technical or engineered material use); USES (Uses)
(**magnesium**-based **hydrogen storage** alloys
having high capacity, fast kinetics, and long cycle life for automotive
applications)

IT **1333-74-0, Hydrogen**, uses
RL: CPS (Chemical process); PEP (Physical, engineering or chemical
process); PYP (Physical process); TEM (Technical or engineered material
use); PROC (Process); USES (Uses)
(**magnesium**-based **hydrogen storage** alloys
having high capacity, fast kinetics, and long cycle life for automotive
applications)

RN 1333-74-0 HCA

CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H— H

IT **340711-50-4**
RL: TEM (Technical or engineered material use); USES (Uses)
(**magnesium**-based **hydrogen storage** alloys
having high capacity, fast kinetics, and long cycle life for automotive
applications)

RN 340711-50-4 HCA

CN Magnesium alloy, base, Mg 91,Al 5.6,misch metal 2,Ni 0.9,Y 0.5 (9CI) (CA
INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	91	7439-95-4
Al	5.6	7429-90-5
Misch metal	2	8049-20-5
Ni	0.9	7440-02-0
Y	0.5	7440-65-5

L86 ANSWER 4 OF 31 HCA COPYRIGHT 2003 ACS on STN

135:197966 Preparation and protium absorbing properties of **Mg**-based
ternary alloys. Takamura, H.; Amemiya, T.; Kamegawa, A.; Okada, M.
(Department of Materials Science, Graduate School of Engineering, Tohoku
University, Sendai, 980-8579, Japan). Materials Science Forum,
350-351(Magnesium Alloys 2000), 315-320 (English) **2000**. CODEN:
MSFOEP. ISSN: 0255-5476. Publisher: Trans Tech Publications Ltd..

AB The protium absorbing properties of **Mg**-Y-Ni, **Mg**-Y-Cu,
and **Mg**-Al-Cu ternary alloys have been investigated in

conjunction with phases present and microstructures. The alloys with a **Mg**-rich compn. (.apprxeq.80 at%**Mg**) were prepd. by a flux-melting technique. It was found that the **Mg**-10Y-10Ni alloy with **Mg**, Mg24Y5, Mg2Ni, and MgNi2 (C15-type Laves structure) phases formed **hydrides** of Mg2Ni and **Mg** at 373 and 473 K, resp. The decrease in the reaction temp. can be attributed to a morphol. improvement, where **Mg** and Mg24 Y5 main phases with a needle-like shape surrounded by the Mg2Ni and MgNi2 phases, and/or the effect of Y incorporated into these phases. The **Mg**-10Y-10Ni alloy absorbed 4.0 and 4.5 mass% of protium at 473 and 573 K, resp. For the **Mg**-10Y-10Cu alloy, a two-step plateau regime was obsd. due to the disproportionation of the Mg2Cu phase. The **Mg**-6Y-24Cu alloys exhibited a protium storage capacity of 3.4 mass%, and its plateau pressure for the desorption process was about 0.08 MPa at 523 K. The **Mg**-10Al-10Cu alloy absorbed 4.5 mass% of protium. However, a temp. as high as 573 K was needed for observing the protium absorption - desorption process.

CC **52-3** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56

ST **hydrogen storage magnesium** ternary cast alloy; protonium absorption **magnesium** ternary cast alloy

IT Melting
(alloy; protium absorbing properties of **magnesium** ternary cast alloys prepd. by melting for **hydrogen storage**)

IT **Hydrides**
RL: FMU (Formation, unclassified); FORM (Formation, nonpreparative)
(formation of; protium absorbing properties of **magnesium** ternary cast alloys prepd. by melting for **hydrogen storage**)

IT Cast alloys
RL: PEP (Physical, engineering or chemical process); PRP (Properties); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(**magnesium** alloys; protium absorbing properties of **magnesium** ternary cast alloys prepd. by melting for **hydrogen storage**)

IT Absorption
Desorption
Microstructure
Phase composition
(protium absorbing properties of **magnesium** ternary cast alloys prepd. by melting for **hydrogen storage**)

IT Laves phases
RL: FMU (Formation, unclassified); FORM (Formation, nonpreparative)
(protium absorbing properties of **magnesium** ternary cast alloys prepd. by melting for **hydrogen storage**)

IT **127817-55-4**, Copper 10, **magnesium** 80, yttrium 10
(atomic) 313952-21-5, Aluminum 10, copper 10, **magnesium** 80
(atomic) 313952-22-6, Aluminum 15, copper 15, **magnesium** 70
(atomic) 313952-23-7, Aluminum 20, copper 20, **magnesium** 60
(atomic) **356527-62-3 356527-63-4 356527-64-5**
RL: PEP (Physical, engineering or chemical process); PRP (Properties); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(protium absorbing properties of **magnesium** ternary cast alloys prepd. by melting for **hydrogen storage**)

IT **1333-74-0**, Protium, uses
RL: PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(protium absorbing properties of **magnesium** ternary cast alloys prepd. by melting for **hydrogen storage**)

IT **127817-55-4**, Copper 10, **magnesium** 80, yttrium 10 (atomic) **356527-62-3 356527-63-4 356527-64-5**
RL: PEP (Physical, engineering or chemical process); PRP (Properties); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(protium absorbing properties of **magnesium** ternary cast alloys prepd. by melting for **hydrogen storage**)
RN 127817-55-4 HCA
CN Magnesium alloy, base, Mg 56,Y 26,Cu 18 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	56	7439-95-4
Y	26	7440-65-5
Cu	18	7440-50-8

RN 356527-62-3 HCA
CN Magnesium alloy, base, Mg 57,Y 26,Ni 17 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	57	7439-95-4
Y	26	7440-65-5
Ni	17	7440-02-0

RN 356527-63-4 HCA
CN Magnesium alloy, base, Mg 59,Ni 23,Y 18 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	59	7439-95-4
Ni	23	7440-02-0
Y	18	7440-65-5

RN 356527-64-5 HCA
CN Magnesium alloy, base, Mg 45,Cu 41,Y 14 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	45	7439-95-4
Cu	41	7440-50-8
Y	14	7440-65-5

IT **1333-74-0**, Protium, uses
RL: PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(protium absorbing properties of **magnesium** ternary cast alloys prepd. by melting for **hydrogen storage**)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H—H

L86 ANSWER 5 OF 31 HCA COPYRIGHT 2003 ACS on STN
135:63894 Method for synthesis of **hydrogen storage** alloy

alloy powder from component material. Ovshinsky, Stanford R. (Energy Conversion Devices, Inc., USA). PCT Int. Appl. WO 2001048837 A2 20010705, 43 pp. DESIGNATED STATES: W: AU, BR, CA, CN, IN, JP, KR, MX, NO, RU, SG, UA; RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2000-US32871 20001204. PRIORITY: US 1999-460530 19991213.

AB A method for making a **hydrided hydrogen storage** alloy powder from component material is disclosed. In the present method a material is worked at the same time it is **hydrided**. Working preferably involves comminution of the material.

IC ICM H01M

CC **52-3** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56

ST **hydrogen storage** alloy synthesis

IT **Hydriding**
(method for synthesis of **hydrogen storage** alloy powder from component material)

IT **1333-74-0, Hydrogen**, uses
RL: PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(method for synthesis of **hydrogen storage** alloy powder from component material)

IT 325686-06-4 **340711-50-4**
RL: TEM (Technical or engineered material use); USES (Uses)
(method for synthesis of **hydrogen storage** alloy powder from component material)

IT **1333-74-0, Hydrogen**, uses
RL: PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(method for synthesis of **hydrogen storage** alloy powder from component material)

RN 1333-74-0 HCA

CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H—H

IT **340711-50-4**
RL: TEM (Technical or engineered material use); USES (Uses)
(method for synthesis of **hydrogen storage** alloy powder from component material)

RN 340711-50-4 HCA

CN Magnesium alloy, base, Mg 91,Al 5.6,misch metal 2,Ni 0.9,Y 0.5 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	91	7439-95-4
Al	5.6	7429-90-5
Misch metal	2	8049-20-5
Ni	0.9	7440-02-0
Y	0.5	7440-65-5

L86 ANSWER 6 OF 31 HCA COPYRIGHT 2003 ACS on STN
134:369491 **Hydrogen**-based ecosystem using **hydrogen storage** alloys. Ovshinsky, Stanford R.; Young, Rosa T. (Energy

Conversion Devices, Inc., USA). PCT Int. Appl. WO 2001039289 A2 20010531, 68 pp. DESIGNATED STATES: W: AU, BR, CA, CN, IN, JP, KR, MX; NO, RU, SG, UA; RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2000-US31271 20001114. PRIORITY: US 1999-444810 19991122.

AB A complete infrastructure system for the generation, storage, transportation, and delivery of **hydrogen** makes a **hydrogen** ecosystem possible. The infrastructure system utilizes high capacity, low cost, light wt. thermal **hydrogen storage** alloy materials having fast kinetics. Also, a novel **hydrogen storage** bed design which includes a support/heat-transfer component which is made from a highly porous, high thermal cond., solid material such as a high thermal cond. graphitic foam. Finally a material including at least one particle having atomically engineered local chem. and electronic environments, characterized in that the local environments providing bulk nucleation.

IC ICM H01M

CC **52-3** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56

ST **hydrogen** based ecosystem; alloy **hydrogen storage hydrogen** based ecosystem

IT Filters
(Pd; **hydrogen**-based ecosystem using **hydrogen storage** alloys)

IT Nucleation
(bulk; **hydrogen**-based ecosystem using **hydrogen storage** alloys)

IT Combustion apparatus
(catalytic; **hydrogen**-based ecosystem using **hydrogen storage** alloys)

IT Wave
(energy; **hydrogen**-based ecosystem using **hydrogen storage** alloys)

IT Fuels
(fossil; **hydrogen**-based ecosystem using **hydrogen storage** alloys)

IT Foams
(graphitic; **hydrogen**-based ecosystem using **hydrogen storage** alloys)

IT Reforming
(hydrocarbons; **hydrogen**-based ecosystem using **hydrogen storage** alloys)

IT Power
(hydroelec.; **hydrogen**-based ecosystem using **hydrogen storage** alloys)

IT Absorption kinetics
Compressors
Ecosystem
Electric heaters
Electrolytic cells
Geothermal energy
Heat transfer
Hydriding
Nuclear energy
Solar cells
Solar energy
Wind energy
(**hydrogen**-based ecosystem using **hydrogen storage** alloys)

IT Coal, uses
Hydrides
Natural gas, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(**hydrogen**-based ecosystem using **hydrogen storage** alloys)

IT Pumps
(mech.; **hydrogen**-based ecosystem using **hydrogen storage** alloys)

IT Energy
(ocean thermal; **hydrogen**-based ecosystem using **hydrogen storage** alloys)

IT Hydrocarbons, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(reforming; **hydrogen**-based ecosystem using **hydrogen storage** alloys)

IT Fuels
(refueling; **hydrogen**-based ecosystem using **hydrogen storage** alloys)

IT Waste heat
(utilization; **hydrogen**-based ecosystem using **hydrogen storage** alloys)

IT **Magnesium** alloy
RL: TEM (Technical or engineered material use); USES (Uses)
(**hydrogen**-based ecosystem using **hydrogen storage** alloys)

IT 7732-18-5, Water, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(electrolysis; **hydrogen**-based ecosystem using **hydrogen storage** alloys)

IT 7440-05-3, Palladium, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(filters; **hydrogen**-based ecosystem using **hydrogen storage** alloys)

IT 7782-42-5, Graphite, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(foams; **hydrogen**-based ecosystem using **hydrogen storage** alloys)

IT 7440-21-3, Silicon, uses
RL: DEV (Device component use); USES (Uses)
(**hydrogen**-based ecosystem using **hydrogen storage** alloys)

IT **1333-74-0P, Hydrogen,** uses
RL: IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PREP (Preparation); PROC (Process); USES (Uses)
(**hydrogen**-based ecosystem using **hydrogen storage** alloys)

IT 7782-44-7, Oxygen, processes
RL: REM (Removal or disposal); PROC (Process)
(**hydrogen**-based ecosystem using **hydrogen storage** alloys)

IT 325686-05-3 325686-06-4 **340711-50-4**
RL: TEM (Technical or engineered material use); USES (Uses)
(**hydrogen**-based ecosystem using **hydrogen storage** alloys)

IT 7429-90-5, Aluminum, uses 7439-89-6, Iron, uses 7440-02-0, Nickel, uses 7440-50-8, Copper, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(support; **hydrogen**-based ecosystem using **hydrogen**

storage alloys)
IT **1333-74-0P, Hydrogen**, uses
RL: IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PREP (Preparation); PROC (Process); USES (Uses)
(**hydrogen**-based ecosystem using **hydrogen storage** alloys)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H— H

IT **340711-50-4**
RL: TEM (Technical or engineered material use); USES (Uses)
(**hydrogen**-based ecosystem using **hydrogen storage** alloys)
RN 340711-50-4 HCA
CN Magnesium alloy, base, Mg 91,Al 5.6,misch metal 2,Ni 0.9,Y 0.5 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	91	7439-95-4
Al	5.6	7429-90-5
Misch metal	2	8049-20-5
Ni	0.9	7440-02-0
Y	0.5	7440-65-5

L86 ANSWER 7 OF 31 HCA COPYRIGHT 2003 ACS on STN
134:6902 **Hydrogen storage** properties of new ternary system alloys: La2MgNi9, La5Mg2Ni23, La3MgNi14. Kohno, T.; Yoshida, H.; Kawashima, F.; Inaba, T.; Sakai, I.; Yamamoto, M.; Kanada, M. (Power Supply Materials and Devices Research Laboratories, Corporate Research and Development Center, Toshiba Corporation, Shinagawa-ku, Tokyo, 140-0004, Japan). Journal of Alloys and Compounds, 311(2), L5-L7 (English) **2000**. CODEN: JALCEU. ISSN: 0925-8388. Publisher: Elsevier Science S.A..
AB The **hydrogen storage** properties of the new ternary system alloys, La2MgNi9, La5Mg2Ni23, La3MgNi14, were investigated. As a result, the neg. electrode of the La5Mg2Ni23, alloy (La0.7Mg0.3Ni2.8Co0.5) showed a large discharge capacity (410 mAh/g), 1.3 times larger than that of AB3 type alloys. These ternary system alloys were found to be mainly composed of stacked AB5 and AB2 structure subunits in a superstructure arrangement.
CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56, 72
ST battery metal **hydride** anode alloy; lanthanum **magnesium** nickel alloy **hydrogen storage**; AB5 AB2 structure alloy anode
IT Battery anodes
Crystal structure
Secondary batteries
(**hydrogen storage** properties of new ternary system alloys: La2MgNi9, La5Mg2Ni23, La3MgNi14)
IT **308812-20-6 308812-21-7 308812-22-8**
RL: DEV (Device component use); USES (Uses)

(**hydrogen storage** properties of new ternary system alloys: La2MgNi9, La5Mg2Ni23, La3MgNi14)
IT **308812-20-6 308812-21-7 308812-22-8**
RL: DEV (Device component use); USES (Uses)
(**hydrogen storage** properties of new ternary system alloys: La2MgNi9, La5Mg2Ni23, La3MgNi14)
RN 308812-20-6 HCA
CN Nickel alloy, base, Ni 53,La 34,Co 11,Mg 2.9 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ni	53	7440-02-0
La	34	7439-91-0
Co	11	7440-48-4
Mg	2.9	7439-95-4

RN 308812-21-7 HCA
CN Nickel alloy, base, Ni 55,La 33,Co 9.9,Mg 2.4 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ni	55	7440-02-0
La	33	7439-91-0
Co	9.9	7440-48-4
Mg	2.4	7439-95-4

RN 308812-22-8 HCA
CN Nickel alloy, base, Ni 56,La 33,Co 9.3,Mg 1.9 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ni	56	7440-02-0
La	33	7439-91-0
Co	9.3	7440-48-4
Mg	1.9	7439-95-4

L86 ANSWER 8 OF 31 HCA COPYRIGHT 2003 ACS on STN
133:298706 An AC impedance study of self-discharge mechanism of nickel-metal **hydride** (Ni-MH) battery using Mg2Ni-type **hydrogen storage** alloy anode. Cui, N.; Luo, J. L. (Department of Chemical and Materials Engineering, University of Alberta, Edmonton, AB, T6G 2G6, Can.). Electrochimica Acta, 45(24), 3973-3981 (English) **2000**. CODEN: ELCAAV. ISSN: 0013-4686. Publisher: Elsevier Science Ltd..
AB The self-discharge mechanism during storage in open-circuit states of a Ni-MH battery using a Mg2Ni-type **hydrogen storage** alloy anode was investigated by electrochem. impedance spectroscopy (EIS) and X-ray diffraction (XRD). The loss of discharge capacity for this battery can be ascribed to two causes: (i) desorption of **hydrogen** from the Mg1.95Y0.05Ni0.92Al0.08 **hydride** anode; and (ii) anode surface degrdn. resulting from oxidn. of the **magnesium** alloy in the electrolyte. At the higher open-circuit voltages (OCV), the former was mainly responsible for a high self-discharge rate, while the latter might dominate the loss of capacity at the lower OCV. XRD results confirmed that **Mg**(OH)2 formed on the **magnesium** alloy anode after storage in an open-circuit condition for 20 days.
CC **52-2** (Electrochemical, Radiational, and Thermal Energy

Technology)
Section cross-reference(s): 56, 72, 76
ST nickel metal **hydride** battery self discharge **magnesium** alloy electrode
IT Electric charge
(charge-discharge of nickel-metal **hydride** (Ni-MH) battery under different cycling conditions)
IT Equivalent electric circuits
(for nickel-metal **hydride** (Ni-MH) battery)
IT Open circuit potential
(of capacity retention of nickel-metal **hydride** (Ni-MH) battery)
IT Electric capacitance
(of nickel-metal **hydride** (Ni-MH) battery)
IT Electric impedance
(of self-discharge mechanism of nickel-metal **hydride** (Ni-MH) battery using Mg2Ni-type **hydrogen storage** alloy anode)
IT Electric discharge
Secondary batteries
(self-discharge mechanism of nickel-metal **hydride** (Ni-MH) battery using Mg2Ni-type **hydrogen storage** alloy anode)
IT **Hydrides**
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process); USES (Uses)
(self-discharge mechanism of nickel-metal **hydride** (Ni-MH) battery using Mg2Ni-type **hydrogen storage** alloy anode)
IT 12057-65-7 **228853-81-4**
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(of self-discharge mechanism of nickel-metal **hydride** (Ni-MH) battery using Mg2Ni-type **hydrogen storage** alloy anode)
IT 7440-02-0, Nickel, uses
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(self-discharge mechanism of nickel-metal **hydride** (Ni-MH) battery using Mg2Ni-type **hydrogen storage** alloy anode)
IT **228853-81-4**
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(of self-discharge mechanism of nickel-metal **hydride** (Ni-MH) battery using Mg2Ni-type **hydrogen storage** alloy anode)
RN 228853-81-4 HCA
CN Nickel alloy, base, Ni 50,Mg 44,Y 4.1,Al 2 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ni	50	7440-02-0
Mg	44	7439-95-4
Y	4.1	7440-65-5
Al	2	7429-90-5

L86 ANSWER 9 OF 31 HCA

132:95738 Synthesis and **hydriding**/dehydriding properties of amorphous Mg2Ni1.9M0.1 alloys mechanically alloyed from Mg2Ni0.9M0.1 (M=none, Ni, Ca, La, Y, Al, Si, Cu and Mn) and Ni powder. Terashita, N.; Takahashi, M.; Kobayashi, K.; Sasai, T.; Akiba, E. (Tsukuba Research Laboratory, Japan Metals and Chemicals Corporation, Tsukuba, 300-2635, Japan). Journal of Alloys and Compounds, 293-295, 541-545 (English) **1999**. CODEN: JALCEU. ISSN: 0925-8388. Publisher: Elsevier Science S.A..

AB Amorphous Mg2Ni1.9M0.1 (M=none, Ni, Ca, La, Y, Al, Si, Cu and Mn) alloys were prepd. by mech. alloying of pseudo-binary Mg2Ni0.9M0.1 intermetallic compds. and Ni powder. The crystal structures, thermal stabilities and **hydriding**/dehydriding properties of those alloys were characterized by powder X-ray diffraction, thermal anal. and conventional measurement of pressure compn. isotherms. In spite of the difference in M element, all specimens formed amorphous structures by mech. alloying. Owing to the substitution of Ca the amt. of desorbed **hydrogen** increased from 1.8 wt.% for M=none to 2.1 wt.% for M=Ca by measurement of thermogravimetry. The dehydriding reactions occurred at temps. below about 400 K in both alloys.

CC **52-3** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56

ST **magnesium** nickel alloy amorphous **hydrogen storage**

IT Absorption
Crystal structure
Desorption
Mechanical alloying
(synthesis and **hydriding**/dehydriding properties of amorphous Mg2Ni1.9M0.1 alloys mech. alloyed)

IT 77325-33-8 250579-80-7 254748-25-9 **254748-26-0** **254748-27-1** 254748-28-2 254748-29-3 254748-30-6
RL: NUU (Other use, unclassified); USES (Uses)
(synthesis and **hydriding**/dehydriding properties of amorphous Mg2Ni1.9M0.1 alloys mech. alloyed)

IT **1333-74-0, Hydrogen**, processes
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(synthesis and **hydriding**/dehydriding properties of amorphous Mg2Ni1.9M0.1 alloys mech. alloyed)

IT **254748-26-0 254748-27-1**
RL: NUU (Other use, unclassified); USES (Uses)
(synthesis and **hydriding**/dehydriding properties of amorphous Mg2Ni1.9M0.1 alloys mech. alloyed)

RN 254748-26-0 HCA
CN Nickel alloy, base, Ni 46,Mg 42,La 12 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ni	46	7440-02-0
Mg	42	7439-95-4
La	12	7439-91-0

RN 254748-27-1 HCA
CN Nickel alloy, base, Ni 48,Mg 44,Y 8.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ni	48	7440-02-0

Mg	44	7439-95-4
Y	8.1	7440-65-5

IT **1333-74-0, Hydrogen**, processes
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(synthesis and **hydriding**/dehydriding properties of amorphous
Mg2Ni1.9M0.1 alloys mech. alloyed)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H— H

L86 ANSWER 10 OF 31 HCA COPYRIGHT 2003 ACS on STN
132:38042 A new Mg0.9Y0.1Ni **hydride** forming composition obtained by mechanical grinding. Lenain, C.; Aymard, L.; Dupont, L.; Tarascon, J-M. (Laboratoire de Reactivite et de Chimie des Solides, UPRES-A 6007, Universite de Picardie Jules Verne, Amiens, 80039, Fr.). Journal of Alloys and Compounds, 292(1-2), 84-89 (English) **1999**. CODEN: JALCEU. ISSN: 0925-8388. Publisher: Elsevier Science S.A..
AB We report on the synthesis of an electrochem. active Mg0.9Y0.1Ni polynanocryst. phase by mech. alloying. This alloy presents an initial capacity of 323 mAh/g that decreases upon cycling to reach a stable value of 220 mAh/g after 30 complete charge/discharge cycles (e.g. 62% capacity retention). Such an increase in capacity retention with respect to pure MgNi alloy (62% instead of 24%) is due to the addn. of yttrium that enhances the resistance of the alloy against corrosion in concd. alk. media.
CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56, 72
ST **magnesium** yttrium nickel mech alloying; **hydrogen storage magnesium** yttrium nickel alloy; battery anode **magnesium** nickel alloy
IT Battery anodes
Mechanical alloying
Secondary batteries
(Mg0.9Y0.1Ni **hydride** forming compn. obtained by mech. grinding for battery anode)
IT **252570-82-4**
RL: DEV (Device component use); USES (Uses)
(Mg0.9Y0.1Ni **hydride** forming compn. obtained by mech. grinding for battery anode)
IT **1333-74-0, Hydrogen**, processes
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(battery anode alloy storing; Mg0.9Y0.1Ni **hydride** forming compn. obtained by mech. grinding for battery anode)
IT **252570-82-4**
RL: DEV (Device component use); USES (Uses)
(Mg0.9Y0.1Ni **hydride** forming compn. obtained by mech. grinding for battery anode)
RN 252570-82-4 HCA
CN Nickel alloy, base, Ni 66,Mg 24,Y 9.9 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ni	66	7440-02-0
Mg	24	7439-95-4

    Y   9.9   7440-65-5

IT   **1333-74-0, Hydrogen**, processes
      RL: PEP (Physical, engineering or chemical process); PROC (Process)
         (battery anode alloy storing; Mg0.9Y0.1Ni **hydride** forming
         compn. obtained by mech. grinding for battery anode)
RN   1333-74-0   HCA
CN   Hydrogen (8CI, 9CI)   (CA INDEX NAME)

H—H

L86 ANSWER 11 OF 31 HCA COPYRIGHT 2003 ACS on STN
131:172656 **Hydrogen** behavior in the LaMgCu system. Kadir, K.;
      Tanaka, H.; Sakai, T.; Uehara, I. (Osaka National Research Institute,
      Osaka, 563-8577, Japan). Journal of Alloys and Compounds, 289(1-2), 66-70
      (English) **1999**. CODEN: JALCEU. ISSN: 0925-8388. Publisher:
      Elsevier Science S.A..
AB   A new hexagonal intermetallic phase has been detected in a LaMg2Cu2
      prepn., which absorbs large quantities of **hydrogen** (.apprx.2.4
      wt.%). The dissocn. pressure of the **hydride** reaches nearly
      .apprx.0.4 atm at 170.degree.C. The **hydrogen**
      absorption/desorption properties have been detd. by thermal anal. and
      pressure-compn. isotherms.
CC   **52-3** (Electrochemical, Radiational, and Thermal Energy
      Technology)
      Section cross-reference(s): 56
ST   copper lanthanum **magnesium** alloy **hydrogen**
      storage
IT   Absorption
      Crystal structure
      Energy **storage**
         (**hydrogen** behavior in the LaMgCu system)
IT   **238092-25-6**
      RL: NUU (Other use, unclassified); USES (Uses)
         (**hydrogen** behavior in the LaMgCu system)
IT   **1333-74-0, Hydrogen**, processes
      RL: PEP (Physical, engineering or chemical process); PROC (Process)
         (**storage** of; **hydrogen** behavior in the LaMgCu
         system)
IT   **238092-25-6**
      RL: NUU (Other use, unclassified); USES (Uses)
         (**hydrogen** behavior in the LaMgCu system)
RN   238092-25-6   HCA
CN   Lanthanum alloy, base, La 44,Cu 40,Mg 15 (9CI)   (CA INDEX NAME)

Component	Component Percent	Component Registry Number
La	44	7439-91-0
Cu	40	7440-50-8
Mg	15	7439-95-4

IT   **1333-74-0, Hydrogen**, processes
      RL: PEP (Physical, engineering or chemical process); PROC (Process)
         (**storage** of; **hydrogen** behavior in the LaMgCu
         system)
RN   1333-74-0   HCA
CN   Hydrogen (8CI, 9CI)   (CA INDEX NAME)

H— H

L86 ANSWER 12 OF 31 HCA COPYRIGHT 2003 ACS on STN
131:118437 Nanocrystalline **magnesium** for **hydrogen storage**. Zaluska, A.; Zaluski, L.; Strom-Olsen, J. O. (Centre for the Physics of Materials and Department of Physics, McGill University, Montreal, QC, Can.). Journal of Alloys and Compounds, 288(1-2), 217-225 (English) **1999**. CODEN: JALCEU. ISSN: 0925-8388. Publisher: Elsevier Science S.A..

AB The **hydrogen storage** properties of MgH2 are significantly enhanced by a proper engineering of the microstructure and surface. **Magnesium** powders are produced in a nanocryst. form, which gives remarkable improvement of absorption/desorption kinetics. Ball milling, which is used for fabrication of nanocryst. **magnesium**, improves both the morphol. of the powders and the surface activity for hydrogenation. The **hydriding** properties are further enhanced by catalysis through nano-particles of Pd located on **magnesium** surface. Nanocryst. **magnesium** with such a catalyst exhibits an outstanding hydrogenation performance: very fast kinetics, operation at lower temps. than conventional **magnesium** and no need for activation.

CC **52-3** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56, 67

ST **magnesium** nanocryst **hydrogen storage**; absorption desorption kinetic **hydrogen magnesium**; hydrogenation catalyst **magnesium** alloy **hydride**

IT Absorption kinetics
Hydrogenation catalysts
(nanocryst. **magnesium** for **hydrogen storage**)

IT 7439-95-4, **Magnesium**, uses 107138-81-8 117245-10-0 232946-22-4 232946-23-5 **232946-24-6**
RL: NUU (Other use, unclassified); USES (Uses)
(nanocryst. **magnesium** for **hydrogen storage**)

IT **1333-74-0, Hydrogen**, processes
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(nanocryst. **magnesium** for **hydrogen storage**)

IT **232946-24-6**
RL: NUU (Other use, unclassified); USES (Uses)
(nanocryst. **magnesium** for **hydrogen storage**)

RN 232946-24-6 HCA
CN Magnesium alloy, base, Mg 56,Y 25,Zn 19 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	56	7439-95-4
Y	25	7440-65-5
Zn	19	7440-66-6

IT **1333-74-0, Hydrogen**, processes
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(nanocryst. **magnesium** for **hydrogen storage**

)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H—H

L86 ANSWER 13 OF 31 HCA COPYRIGHT 2003 ACS on STN
131:33824 Nanocrystalline **Mg**-Ni-based **hydrogen storage** alloys produced by nanocrystallization. Spassov, T.; Koster, U. (Dep. Chem. Eng., Univ. Dortmund, Dortmund, D-44221, Germany). Materials Science Forum, 307(Advances in Nanocrystallization), 197-202 (English) **1999**. CODEN: MSFOEP. ISSN: 0255-5476. Publisher: Trans Tech Publications Ltd..

AB Nanocryst. **Mg**-Ni-Y alloys were produced by crystn. of amorphous precursors and by direct quenching of the melt, using a melt spinning technique. The crystn. behavior of Mg2Ni-based and **Mg**-based amorphous as well as of nanocryst. alloys contg. a large amt. of amorphous phases, was investigated by TEM, DSC, x-ray diffraction, and electron diffraction. During heating, the as-quenched Mg2(Ni,Y) alloys crystallize by 3-D growth of quenched-in nanocrystals (.apprx.2-3 nm), embedded into the amorphous matrix, with an activation energy (AE) of 140 kJ/mol, which value coincides with the AE of **Mg** self-diffusion. The crystn. of the melt-spun **Mg**-based alloy (Mg87Ni12Y1) was a two-stage process, which leads to a nanocryst. microstructure with grain size of .apprx.100 nm. The influence of H on the thermal stability and crystn. of the melt-spun alloys was also investigated. The **hydrogen**-satn. of the as-quenched amorphous and nanocryst. alloys led to a change in the crystn. mechanism during subsequent annealing, as the microstructure remained nanocryst. even after heating to 350.degree.. The **hydriding** properties of the as-quenched alloys were then studied. The max. H absorption capacity and the **hydrogen**-satn. kinetics of the melt-spun Mg2(Ni,Y) alloys were better than those of conventional polycryst. **Mg** alloys and were comparable to the H-absorption characteristics of nanocryst. ball-milled Mg2Ni.

CC **52-3** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56

ST nanocryst **magnesium** nickel alloy **hydrogen storage** crystn; **hydrogen** absorption kinetics nanocryst **magnesium** nickel alloy

IT Annealing
Crystallization
(crystn. mechanism in annealing of nanocryst. **Mg**-Ni-based **hydrogen storage** alloys)

IT Nanocrystalline metals
RL: PEP (Physical, engineering or chemical process); PRP (Properties); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(crystn. mechanism in annealing of nanocryst. **Mg**-Ni-based **hydrogen storage** alloys)

IT Absorption kinetics
(**hydrogen** absorption kinetics of nanocryst. **Mg** -Ni-based **hydrogen storage** alloys produced by nanocrystn.)

IT Absorption
(**hydrogen; hydrogen** absorption capacity of nanocryst. **Mg**-Ni-based **hydrogen storage** alloys produced by nanocrystn.)

IT Crystallization enthalpy

(in annealing of nanocryst. **Mg**-Ni-based **hydrogen storage** alloys)

IT Metallic glasses
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(**magnesium** alloy; crystn. mechanism in annealing of nanocryst. **Mg**-Ni-based **hydrogen storage** alloys prepd. from amorphous precursors)

IT Activation energy
(of crystn. in annealing of nanocryst. **Mg**-Ni-based **hydrogen storage** alloys)

IT **1333-74-0, Hydrogen**, processes
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(absorption; in nanocryst. **Mg**-Ni-based **hydrogen storage** alloys produced by nanocrystn.)

IT **215177-22-3, Magnesium** 63, nickel 30, yttrium 7 (atomic)
226938-00-7, Magnesium 87, nickel 12, yttrium 1 (atomic)
RL: PEP (Physical, engineering or chemical process); PRP (Properties); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(crystn. mechanism in annealing of nanocryst. **Mg**-Ni-based **hydrogen storage** alloys)

IT 226938-01-8
RL: FMU (Formation, unclassified); FORM (Formation, nonpreparative)
(hexagonal phase; formation in nanocryst. **Mg**-Ni-based **hydrogen storage** alloys produced by nanocrystn.)

IT **1333-74-0, Hydrogen**, processes
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(absorption; in nanocryst. **Mg**-Ni-based **hydrogen storage** alloys produced by nanocrystn.)

RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H—H

IT **215177-22-3, Magnesium** 63, nickel 30, yttrium 7 (atomic)
226938-00-7, Magnesium 87, nickel 12, yttrium 1 (atomic)
RL: PEP (Physical, engineering or chemical process); PRP (Properties); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(crystn. mechanism in annealing of nanocryst. **Mg**-Ni-based **hydrogen storage** alloys)

RN 215177-22-3 HCA
CN Nickel alloy, base, Ni 45,Mg 39,Y 16 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ni	45	7440-02-0
Mg	39	7439-95-4
Y	16	7440-65-5

RN 226938-00-7 HCA
CN Magnesium alloy, base, Mg 73,Ni 24,Y 3.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	73	7439-95-4
Ni	24	7440-02-0
Y	3.1	7440-65-5

L86 ANSWER 14 OF 31 HCA COPYRIGHT 2003 ACS on STN

130:8284 Effects of oxide additions on electrochemical **hydriding** and dehydriding behavior of Mg2 Ni-type **hydrogen storage** alloy electrode in 6 M KOH solution. Cui, N.; Luo, J. L. (Dep. Chem. & Materials Engineering, Univ. Alberta, Edmonton, AB, T6G 2G6, Can.). Electrochimica Acta, 44(5), 711-720 (English) **1998**. CODEN: ELCAAV. ISSN: 0013-4686. Publisher: Elsevier Science Ltd..

AB Effects of metal oxide addns. on the electrochem. **hydriding** and dehydriding behavior of Mg2Ni-type **hydrogen storage** alloy in 6 M KOH aq. soln. were investigated. The electrode characteristics of mech. alloyed composites of Mg1.9Y0.1Ni0.9Al0.1-5 wt% MO (MO = Ag2O, Fe2O3, MoO3, RuO2 and V2O5) were examd. such as discharge capacity, high-rate dischargeability and cycle life. The discharge capacity and high-rate dischargeability were greatly increased by the modification with the oxide addns., but the cycle life decreased. The electrochem. performances were characterized using both dc polarization and ac impedance anal. techniques. The **hydrogen** diffusivity in the alloys was estd. by an electrochem. method.

CC 72-2 (Electrochemistry)
Section cross-reference(s): **52**, 56

ST **hydrogen storage magnesium** alloy oxide addn; **hydriding** dehydriding **hydrogen** diffusion electrode behavior; nickel metal **hydride** battery electrode behavior

IT Oxides (inorganic), properties
RL: PRP (Properties)
(effects of addn. on electrochem. **hydriding** and dehydriding behavior of Mg2 Ni-type **hydrogen storage** alloy electrode in 6 M KOH soln.)

IT **Hydriding**
(effects of metal oxide addn. on electrochem. **hydriding** and dehydriding of Mg2 Ni-type **hydrogen storage** alloy electrode in 6 M KOH soln.)

IT **Hydrides**
RL: PRP (Properties)
(nickel-metal **hydride** battery; effects of oxide addns. on electrochem. **hydriding** and dehydriding behavior of Mg2 Ni-type **hydrogen storage** alloy electrode in 6 M KOH soln.)

IT Diffusion
(of **hydrogen** in Mg1.9Y0.1Ni0.9Al0.1 alloys)

IT 1309-37-1, Iron oxide Fe2O3, uses 1313-27-5, Molybdenum oxide, uses 1314-62-1, Vanadium oxide V2O5, uses 12036-10-1, Ruthenium oxide RuO2 20667-12-3, Silver oxide
RL: MOA (Modifier or additive use); PRP (Properties); USES (Uses)
(effects of 5% wt. addn. on electrochem. **hydriding** and dehydriding behavior of Mg2 Ni-type **hydrogen storage** alloy electrode in 6 M KOH soln.)

IT 1310-58-3, Potassium hydroxide, uses
RL: NUU (Other use, unclassified); PRP (Properties); USES (Uses)
(effects of 5% wt. addn. on electrochem. **hydriding** and dehydriding behavior of Mg2 Ni-type **hydrogen storage** alloy electrode in soln. of)

IT **173931-53-8**
RL: DEV (Device component use); PRP (Properties); USES (Uses)
(electrochem. **hydriding** and dehydriding behavior in 6 M KOH soln.)

IT 7440-02-0, Nickel, uses
RL: DEV (Device component use); PRP (Properties); USES (Uses)
(fabrication of Mg2 Ni-type **hydrogen storage** alloy

electrode with 5% metal oxide addn. by mech. grinding with)
IT **173931-53-8**
RL: DEV (Device component use); PRP (Properties); USES (Uses)
(electrochem. **hydriding** and dehydriding behavior in 6 M KOH soln.)
RN 173931-53-8 HCA
CN Nickel alloy, base, Ni 48,Mg 42,Y 8,Al 2.4 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ni	48	7440-02-0
Mg	42	7439-95-4
Y	8	7440-65-5
Al	2.4	7429-90-5

L86 ANSWER 15 OF 31 HCA
129:333282 Thermal stability and **hydriding** properties of nanocrystalline melt-spun Mg63Ni30Y7 alloy. Spassov, Tony; Koster, Uwe (Dept. Chem. Eng., University of Dortmund, Dortmund, D-44221, Germany). Journal of Alloys and Compounds, 279(2), 279-286 (English) **1998**. CODEN: JALCEU. ISSN: 0925-8388. Publisher: Elsevier Science S.A..
AB Nanocryst. Mg2(Ni,Y) **hydrogen storage** alloy (with exact compn. Mg63Ni30Y7) was prepd. by rapid solidification, using a melt-spinning technique. Thermal stability and phase transition in the as-quenched alloy were studied by TEM, DSC, X-ray and electron diffraction. It was found that the as-cast material consists of mainly hexagonal Mg2(Ni,Y) nanocrystals with an av. size of 2-3 nm and a significant amt. of amorphous phase with similar compn. located between them. During heating the alloy crystallizes completely by three dimensional nanocrystal growth, with an activation energy of 140.+-.7 kJ mol-1. The **hydriding** properties of the as-quenched nanocryst. alloy were studied as well. The max. **hydrogen** absorption capacity (about 3.0 wt.%) and hydrogenation kinetics of the melt-spun Mg2(Ni,Y) were found to exceed those of the conventionally prepd. polycryst. Mg2Ni alloys and to be comparable to the **hydrogen** absorption characteristics of nanocryst. ball-milled Mg2Ni. Hydrogenation of the as-cast alloy causes a change in the crystn. mechanism during annealing, as the microstructure remains nanocryst. (15-20 nm) even after complete crystn. of the alloy.
CC **52-3** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56
ST **hydrogen storage magnesium** nickel yttrium alloy
IT Absorption kinetics
Rapid solidification
(thermal stability and **hydriding** properties of nanocryst. melt-spun Mg63Ni30Y7 alloy)
IT **1333-74-0, Hydrogen,** uses
RL: PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(thermal stability and **hydriding** properties of nanocryst. melt-spun Mg63Ni30Y7 alloy)
IT **215177-22-3**
RL: TEM (Technical or engineered material use); USES (Uses)
(thermal stability and **hydriding** properties of nanocryst. melt-spun Mg63Ni30Y7 alloy)
IT **1333-74-0, Hydrogen,** uses

RL: PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(thermal stability and **hydriding** properties of nanocryst. melt-spun Mg63Ni30Y7 alloy)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H—H

IT **215177-22-3**
RL: TEM (Technical or engineered material use); USES (Uses)
(thermal stability and **hydriding** properties of nanocryst. melt-spun Mg63Ni30Y7 alloy)
RN 215177-22-3 HCA
CN Nickel alloy, base, Ni 45,Mg 39,Y 16 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ni	45	7440-02-0
Mg	39	7439-95-4
Y	16	7440-65-5

L86 ANSWER 16 OF 31 HCA COPYRIGHT 2003 ACS on STN
128:156537 Effects of microencapsulation on the electrode behavior of Mg2Ni-based **hydrogen storage** alloy in alkaline solution. Luo, J. L.; Cui, N. (Edmonton, Department of Chemical and Materials Engineering, University of Alberta, Alberta, T6G 2G6, Can.). Journal of Alloys and Compounds, 264(1-2), 299-305 (English) **1998** . CODEN: JALCEU. ISSN: 0925-8388. Publisher: Elsevier Science S.A..
AB In order to improve the electrochem. performance of Mg2Ni-based **hydride** electrode in alk. soln., the multicomponent Mg2Ni-based alloy (Mg1.9Y0.1Ni0.9Al0.1) powder was microencapsulated with Ni-P, Ni-Pd-P and Ni-B coatings, resp., using a low-temp. electroless plating method. The electrode characteristics were examd. such as electrochem. capacity, high-rate dischargeability and cycle life, in comparison with those of the electrode fabricated from a bare (uncoated) alloy powder. It was found that the surface modifications with Ni alloy coatings effectively improved the electrode performance of Mg2Ni-based alloy. The Ni-Pd-P coated alloy electrode showed the highest discharge capacity and high-rate dischargeability, while the Ni-P coated alloy electrode displayed the slowest capacity decay. The electrochem. performance of the modified Mg2Ni-based alloy was characterized using d.c. polarization and a.c. impedance technique, and its phase compn. and microstructure were detected by X-ray diffraction and scanning electron microscope. It was found that the surface microencapsulation of alloy powder was effective in improving the electrode discharge performance, but seems to be ineffective in prohibiting disintegration of the Mg2Ni-based alloy powder.
CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
ST battery anode **hydrogen** absorption alloy; microencapsulation effect **magnesium** nickel alloy electrode
IT Battery anodes
(effects of microencapsulation on the electrode behavior of Mg2Ni-based **hydrogen storage** alloy in alk. soln.)
IT Encapsulation
(microencapsulation; effects of microencapsulation on the electrode behavior of Mg2Ni-based **hydrogen storage** alloy in

alk. soln.)
IT **173931-53-8**
RL: DEV (Device component use); USES (Uses)
(effects of microencapsulation on the electrode behavior of Mg2Ni-based **hydrogen storage** alloy in alk. soln.)
IT **1333-74-0, Hydrogen**, uses 11104-08-8, Nickel phosphide
12619-90-8, Nickel boride 59088-48-1, Nickel palladium phosphide
RL: TEM (Technical or engineered material use); USES (Uses)
(effects of microencapsulation on the electrode behavior of Mg2Ni-based **hydrogen storage** alloy in alk. soln.)
IT **173931-53-8**
RL: DEV (Device component use); USES (Uses)
(effects of microencapsulation on the electrode behavior of Mg2Ni-based **hydrogen storage** alloy in alk. soln.)
RN 173931-53-8 HCA
CN Nickel alloy, base, Ni 48,Mg 42,Y 8,Al 2.4 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ni	48	7440-02-0
Mg	42	7439-95-4
Y	8	7440-65-5
Al	2.4	7429-90-5

IT **1333-74-0, Hydrogen**, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(effects of microencapsulation on the electrode behavior of Mg2Ni-based **hydrogen storage** alloy in alk. soln.)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H— H

L86 ANSWER 17 OF 31 HCA COPYRIGHT 2003 ACS on STN
122:138000 Reaction of titanium-**magnesium** pseudoalloys with **hydrogen**. Antonova, M. A.; Barabash, V. A.; Rokhlin, L. L.; Sapozhnikova, A. B. (Russia). Magnievye Splavy Sovrem. Tekh., [Mater. Vses. Soveshch. Issled., Razrab. Primen. Magnievykh Splavov Nar. Khoz.], 2nd, 168-72. Editor(s): Lyakishev, N. P. Nauka: Moscow, Russia. (Russian) **1992**. CODEN: 60TLA2.
AB A review with 2 refs. discussing the reaction of Ti-**Mg** alloys having composite two-phase microstructure with H.
CC **52-0** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56
ST review titanium **magnesium** alloy **hydrogen storage**
IT **1333-74-0, Hydrogen**, uses
RL: PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(reaction of **magnesium**-titanium alloys having composite two-phase microstructure with **hydrogen** for **storage** by **hydride** formation)
IT 110803-46-8 110803-47-9 110803-49-1 **161184-85-6**
161184-86-7 161184-87-8 161184-88-9
RL: PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)

(two-phase alloy; reaction of **magnesium**-titanium alloys with **hydrogen** for **storage** by **hydride** formation)

IT **1333-74-0, Hydrogen**, uses
RL: PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(reaction of **magnesium**-titanium alloys having composite two-phase microstructure with **hydrogen** for **storage** by **hydride** formation)

RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H—H

IT **161184-85-6 161184-86-7**
RL: PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(two-phase alloy; reaction of **magnesium**-titanium alloys with **hydrogen** for **storage** by **hydride** formation)

RN 161184-85-6 HCA
CN Titanium alloy, base, Ti 83,Mg 9.4,Y 7.6 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ti	83	7440-32-6
Mg	9.4	7439-95-4
Y	7.6	7440-65-5

RN 161184-86-7 HCA
CN Titanium alloy, base, Ti 82,Mg 11,La 7.4 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ti	82	7440-32-6
Mg	11	7439-95-4
La	7.4	7439-91-0

L86 ANSWER 18 OF 31 HCA COPYRIGHT 2003 ACS on STN
122:60132 The **hydrogen storage** properties and the mechanism of the **hydriding** process of some multi-component **magnesium**-base **hydrogen storage** alloys. Au, Ming; Wu, Jing; Wang, Qidong (Dep. Materials Sci. Eng., Zhejiang Univ., Hangzhou, 310027, Peop. Rep. China). International Journal of Hydrogen Energy, 20(2), 141-50 (English) **1995**. CODEN: IJHEDX. ISSN: 0360-3199. Publisher: Elsevier.

AB The H storage properties of multicomponent **Mg**-based alloys were studied. Of the alloys studied Mg0.833Ni0.066Cu0.095Mm0.006 (Mm = La-rich misch metal) had the best **hydriding**/dehydriding properties. Based on the investigation of the relation between **hydriding** /dehydriding behavior and microg. morphol., it was found that the morphol. of some phase constituents in the alloy has an important influence on the **hydriding**/dehydriding processes. The effect of surface segregation of Ni, Cu, and rare earth metals on kinetics of **hydriding**/dehydriding processes was examd. by means of AES and metallog. observations. On the basis of all these exptl. observations, a model for the **hydriding**/dehydriding processes of the multicomponent **Mg**-based alloys, the model of surface segregation

and interface microcrack passages, was proposed.
CC **52-3** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56
ST **hydrogen storage** property **magnesium** alloy; nickel **magnesium** alloy **hydrogen storage** property
IT Absorption
(properties and mechanism of **hydriding** process of multicomponent **magnesium**-based alloys for **storage** of **hydrogen**)
IT **1333-74-0, Hydrogen,** uses
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(properties and mechanism of **hydriding** process of multicomponent **magnesium**-based alloys for **storage** of **hydrogen**)
IT 94506-26-0 94506-27-1 94528-70-8 **160097-26-7**
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process)
(properties and mechanism of **hydriding** process of multicomponent **magnesium**-based alloys for **storage** of **hydrogen**)
IT **1333-74-0, Hydrogen,** uses
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(properties and mechanism of **hydriding** process of multicomponent **magnesium**-based alloys for **storage** of **hydrogen**)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H—H

IT **160097-26-7**
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process)
(properties and mechanism of **hydriding** process of multicomponent **magnesium**-based alloys for **storage** of **hydrogen**)
RN 160097-26-7 HCA
CN Magnesium alloy, base, Mg 82,Ni 10,Cu 4.3,Y 2.8,Si 0.4 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	82	7439-95-4
Ni	10	7440-02-0
Cu	4.3	7440-50-8
Y	2.8	7440-65-5
Si	0.4	7440-21-3

L86 ANSWER 19 OF 31 HCA COPYRIGHT 2003 ACS on STN
120:249266 The activation mechanism of **Mg**-based **hydrogen storage** alloys. Chen, Changpin; Liu, Binghong; Li, Zhoupeng; Wu, Jing; Wang, Qidong (Dep. Mater. Sci. Eng., Zhejiang Univ., Hangzhou, 310027, Peop. Rep. China). Zeitschrift fuer Physikalische Chemie

(Muenchen, Germany), 181(1-2), 259-67 (English) **1993**. CODEN: ZPCFAX. ISSN: 0044-3336.

AB The mechanism of activation and the effects of Cu or Ni chem. plating and mech. milling on the activation of **Mg**, Mg2Ni, and La2Mg16Ni were studied. Oxide films on the surface of **Mg** hinder H penetration until the film starts to crack at .apprx.400.degree.. Mg2Ni can be activated only at high temps. because of the difficulty of H penetration through surface oxide films on alloy particles. Moderately high temps. are required to activate La2Mg16Ni which undergoes disproportionation and afterwards the alloy absorbs H even at room temp.

CC **52-3** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56, 78

ST **magnesium** nickel **hydrogen storage** alloy; **hydriding** activation **magnesium** intermetallic

IT Absorption
(of **hydrogen** by **magnesium** intermetallic alloys, activation mechanism for)

IT **1333-74-0, Hydrogen**, properties
RL: PRP (Properties)
(absorption of, by **magnesium** intermetallic alloys, activation mechanism for)

IT 7439-95-4, **Magnesium**, properties 12057-65-7, Mg2Ni
88896-49-5, La2Mg16Ni
RL: PRP (Properties)
(**hydrogen** absorption by, activation mechanism for, surface oxide role in)

IT **1333-74-0, Hydrogen**, properties
RL: PRP (Properties)
(absorption of, by **magnesium** intermetallic alloys, activation mechanism for)

RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H— H

IT **88896-49-5**, La2Mg16Ni
RL: PRP (Properties)
(**hydrogen** absorption by, activation mechanism for, surface oxide role in)

RN 88896-49-5 HCA
CN Magnesium alloy, base, Mg 54,La 38,Ni 8.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	54	7439-95-4
La	38	7439-91-0
Ni	8.1	7440-02-0

L86 ANSWER 20 OF 31 HCA COPYRIGHT 2003 ACS on STN

109:193753 Effect of some partial substitutions in lanthanum-**magnesium** alloys on their **hydriding** kinetics. Khrussanova, M.; Peshev, P. (Inst. Gen. Inorg. Chem., Sofia, 1040, Bulg.). Journal of Materials Science, 23(6), 2247-50 (English) **1988**. CODEN: JMTSAS. ISSN: 0022-2461.

AB The effect of the partial substitution of Ca for La, and Ni for **Mg**, in the binary alloys La2Mg17 and LaMg12 on the **hydriding**

kinetics of the alloys was studied. The activation energies of H chemisorption on the alloy surfaces and the diffusion of H through the **hydride** layer formed were detd.

CC **52-3** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56, 67

ST **hydrogen storage** lanthanum **magnesium** alloy; kinetics **hydriding** lanthanum **magnesium** calcium; nickel lanthanum **magnesium hydriding** kinetics

IT Kinetics, reaction
(of **hydriding**, of lanthanum **magnesium** alloys, calcium and nickel substitution effect on)

IT 70643-81-1, Lanthanum 10.53, **magnesium** 89.5 **88896-49-5**, Lanthanum 10.53, **Magnesium** 84.2, Nickel 5.26 **111522-34-0** 117245-11-1, Lanthanum 7.69, **magnesium** 92.3
RL: USES (Uses)
(**hydrogen storage** by, **hydriding** kinetics in)

IT **1333-74-0, Hydrogen,** uses and miscellaneous
RL: USES (Uses)
(storage of, lanthanum **magnesium** alloys for, calcium and nickel substitution effect on)

IT **88896-49-5,** Lanthanum 10.53, **Magnesium** 84.2, Nickel 5.26 **111522-34-0**
RL: USES (Uses)
(**hydrogen storage** by, **hydriding** kinetics in)

RN 88896-49-5 HCA
CN Magnesium alloy, base, Mg 54,La 38,Ni 8.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	54	7439-95-4
La	38	7439-91-0
Ni	8.1	7440-02-0

RN 111522-34-0 HCA
CN Magnesium alloy, base, Mg 69,La 30,Ca 1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	69	7439-95-4
La	30	7439-91-0
Ca	1	7440-70-2

IT **1333-74-0, Hydrogen,** uses and miscellaneous
RL: USES (Uses)
(storage of, lanthanum **magnesium** alloys for, calcium and nickel substitution effect on)

RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H—H

L86 ANSWER 21 OF 31 HCA

107:220534 **Hydrogen storage** by pure and
calcium-substituted lanthanum **magnesium** alloys. Pezat, M.; Manaud, J. P.; Darriet, B.; Khrusanova, M.; Terzieva, M.; Peshev, P. (Lab. Chim. Solide, CNRS, Talence, 33405, Fr.). Izvestiya po Khimiya, 20(2), 228-35 (English) **1987**. CODEN: IZKHDX. ISSN: 0324-0401.

AB A partial substitution of Ca for La in LaMg12 decreased the H absorption capacity of the alloy and the rate of H desorption. The single-phase structures of LaMg12 and La1-xCaxMg12 were similar for x .ltoreq.0.2. The **hydriding** of La1-xCaxMg12 leads to the formation of MgH2, La1-xCaxHn, and LaH2. The H absorption capacity of LaMg12, La0.9Ca0.1Mg12, and La0.8Ca0.2Mg12 was studied at various H pressures (5-30 bars).

CC **52-3** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56, 67

ST **hydrogen storage** calcium lanthanum **magnesium**

IT Kinetics, reaction
(of **hydriding**, of lanthanum-**magnesium** and calcium-lanthanum-**magnesium** alloys, **hydrogen storage** in relation to)

IT **111522-33-9 111522-34-0**
RL: TEM (Technical or engineered material use); USES (Uses)
(for **hydrogen storage**, properties of)

IT 74978-56-6
RL: USES (Uses)
(**hydrogen storage** by, calcium substitution effect on)

IT **1333-74-0, Hydrogen**, uses and miscellaneous
RL: USES (Uses)
(storage of, lanthanum-**magnesium** alloy for, calcium substitution effect on)

IT **111522-33-9 111522-34-0**
RL: TEM (Technical or engineered material use); USES (Uses)
(for **hydrogen storage**, properties of)

RN 111522-33-9 HCA
CN Magnesium alloy, base, Mg 71,La 27,Ca 2 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	71	7439-95-4
La	27	7439-91-0
Ca	2	7440-70-2

RN 111522-34-0 HCA
CN Magnesium alloy, base, Mg 69,La 30,Ca 1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	69	7439-95-4
La	30	7439-91-0
Ca	1	7440-70-2

IT **1333-74-0, Hydrogen**, uses and miscellaneous
RL: USES (Uses)
(storage of, lanthanum-**magnesium** alloy for, calcium substitution effect on)

RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H— H

L86 ANSWER 22 OF 31 HCA COPYRIGHT 2003 ACS on STN
107:180155 **Hydriding** properties of composites based on titanium and **magnesium**. Antonova, M. M.; Sapozhnikova, A. B.; Skorokhod, V. V.; Karpinos, D. M.; Rokhlin, L. L.; Verbetskii, V. N.; Vishnyakov, L. R.; Nikitina, N. I.; Klyamkin, S. N.; Shalya, I. M. (USSR). Poroshkovaya Metallurgiya (Kiev) (5), 61-6 (Russian) **1987**. CODEN: PMANAI. ISSN: 0032-4795.
AB Ti-**Mg**-Li, Ti-**Mg**-Ni, Ti-**Mg**-Cu, Ti-**Mg**-Y, and Ti-**Mg**-La alloys absorb H almost completely at 0.1 MPa on activation for 0.5 h at 783-1083 K.
CC **52-3** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56
ST titanium **magnesium** alloy **hydrogen storage**;
lithium **magnesium** titanium **hydrogen storage**;
nickel **magnesium** titanium **hydrogen storage**;
copper **magnesium** titanium **hydrogen storage**;
yttrium **magnesium** titanium **hydrogen storage**;
lanthanum **magnesium** titanium **hydrogen storage**
IT 110803-46-8 110803-47-9 110803-48-0 110803-49-1 **110803-50-4** **110803-51-5**
RL: PRP (Properties)
(**hydrogen** absorption by)
IT **1333-74-0, Hydrogen**, uses and miscellaneous
RL: USES (Uses)
(storage of, titanium-**magnesium** alloys for, properties of)
IT **110803-50-4 110803-51-5**
RL: PRP (Properties)
(**hydrogen** absorption by)
RN 110803-50-4 HCA
CN Titanium alloy, base, Ti 83,Mg 9.5,Y 7.9 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ti	83	7440-32-6
Mg	9.5	7439-95-4
Y	7.9	7440-65-5

RN 110803-51-5 HCA
CN Titanium alloy, base, Ti 82,Mg 11,La 7.3 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ti	82	7440-32-6
Mg	11	7439-95-4
La	7.3	7439-91-0

IT **1333-74-0, Hydrogen**, uses and miscellaneous
RL: USES (Uses)
(storage of, titanium-**magnesium** alloys for, properties of)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H— H

L86 ANSWER 23 OF 31 HCA COPYRIGHT 2003 ACS on STN
106:199207 Calcium- and nickel-substituted lanthanum-**magnesium** alloys for **hydrogen storage**. Khrusanova, M.; Peshev, P. (Inst. Gen. Inorg. Chem., Sofia, 1040, Bulg.). Journal of the Less-Common Metals, 131, 379-83 (English) **1987**. CODEN: JCOMAH. ISSN: 0022-5088.

AB The partial substitution of Ni for **Mg** in La2-xCaxMg alloys does not significantly affect their H storage capacity, but accelerates the desorption of H because of the formation of Mg2NiH4. The compn. and properties of La2-xCaxMg16Ni alloys were detd.

CC **52-3** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56, 67

ST **hydrogen storage** lanthanum nickel alloy; calcium **magnesium** lanthanum nickel **hydriding**

IT Kinetics, reaction
(of **hydriding**, of calcium-lanthanum-**magnesium** -nickel alloys)

IT **108364-34-7**, La1.8Ca0.2Mg16Ni **108364-35-8**, La1.6Ca0.4Mg16Ni
RL: USES (Uses)
(**hydrogen storage** by, compn. and structure in relation to)

IT **1333-74-0, Hydrogen**, uses and miscellaneous
RL: USES (Uses)
(storage of, calcium-lanthanum-**magnesium**-nickel alloy for, characteristics of)

IT **108364-34-7**, La1.8Ca0.2Mg16Ni **108364-35-8**, La1.6Ca0.4Mg16Ni
RL: USES (Uses)
(**hydrogen storage** by, compn. and structure in relation to)

RN 108364-34-7 HCA
CN Magnesium alloy, base, Mg 55,La 35,Ni 8.3,Ca 1.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	55	7439-95-4
La	35	7439-91-0
Ni	8.3	7440-02-0
Ca	1.1	7440-70-2

RN 108364-35-8 HCA
CN Magnesium alloy, base, Mg 57,La 32,Ni 8.6,Ca 2.3 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	57	7439-95-4
La	32	7439-91-0
Ni	8.6	7440-02-0
Ca	2.3	7440-70-2

IT **1333-74-0, Hydrogen**, uses and miscellaneous
RL: USES (Uses)

(storage of, calcium-lanthanum-**magnesium**-nickel alloy for,
characteristics of)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H—H

L86 ANSWER 24 OF 31 HCA COPYRIGHT 2003 ACS on STN
106:105405 Multiphase lanthanum calcium **magnesium** (La2-xCaxMg17)
alloys for **hydrogen storage**. Khrussanova, M.;
Terzieva, M.; Peshev, P. (Inst. Gen. Inorg. Chem., Sofia, 1040, Bulg.).
Journal of the Less-Common Metals, 125, 117-25 (English) **1986**.
CODEN: JCOMAH. ISSN: 0022-5088.

AB H storage by alloys with compn. La2-xCaxMg17 (1.4.ltoreq.x.ltoreq.1.8)
representing a mixt. of the phases La2Mg17 [12031-39-9] and CaMg2
[12133-32-3], and **Mg** in various ratios was investigated. These
alloys have good absorption-desorption characteristics and exhibit the
highest H capacity at the lowest **hydriding** pressure (5 bar).
Prolonged cycling with La0.4Ca1.6Mg17 [**106922-48-9**] showed an
initial decrease in its absorption capacity up to the 80-100th cycle,
after which it remained const. and fairly high until the 250th
hydriding-dehydriding cycle. The desorption characteristics of
the alloys under investigation are close to those of single-phase alloys
with the same general formula and a high La content (x <0.4) and
considerably better than the characteristics of La2Mg17. On the basis of
electron microscopy studies and data from the literature, an explanation
of the peculiarities in the behavior of the alloys is proposed.

CC **52-3** (Electrochemical, Radiational, and Thermal Energy
Technology)
Section cross-reference(s): 56, 67
ST **hydrogen storage** lanthanum calcium **magnesium**
IT Kinetics, reaction
(of **hydriding**, of lanthanum-calcium-**magnesium**
alloys)
IT **106922-46-7**, La0.6Ca1.4Mg17 **106922-47-8**, La0.2Ca1.8Mg17
106922-48-9, La0.4Ca1.6Mg17
RL: USES (Uses)
(**hydriding** of, kinetics of, for **hydrogen
storage**)
IT 7439-95-4, **Magnesium**, uses and miscellaneous 12031-39-9
12133-32-3
RL: USES (Uses)
(in lanthanum-calcium-**magnesium** alloys, **hydrogen
storage** in relation to)
IT **1333-74-0, Hydrogen,** uses and miscellaneous
RL: USES (Uses)
(storage of, lanthanum-calcium-**magnesium** alloys for)
IT **106922-46-7**, La0.6Ca1.4Mg17 **106922-47-8**, La0.2Ca1.8Mg17
106922-48-9, La0.4Ca1.6Mg17
RL: USES (Uses)
(**hydriding** of, kinetics of, for **hydrogen
storage**)
RN 106922-46-7 HCA
CN Magnesium alloy, base, Mg 75,La 15,Ca 10 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number

Mg	75	7439-95-4
La	15	7439-91-0
Ca	10	7440-70-2

RN 106922-47-8 HCA
CN Magnesium alloy, base, Mg 81,Ca 14,La 5.4 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	81	7439-95-4
Ca	14	7440-70-2
La	5.4	7439-91-0

RN 106922-48-9 HCA
CN Magnesium alloy, base, Mg 78,Ca 12,La 10 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	78	7439-95-4
Ca	12	7440-70-2
La	10	7439-91-0

IT **1333-74-0, Hydrogen**, uses and miscellaneous
RL: USES (Uses)
(storage of, lanthanum-calcium-**magnesium** alloys for)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H— H

L86 ANSWER 25 OF 31 HCA COPYRIGHT 2003 ACS on STN
104:21908 Calcium-substituted lanthanum-**magnesium** alloys for **hydrogen storage**. Khrusanova, M.; Terzieva, M.; Peshev, P.; Petrov, K.; Pezat, M.; Manaud, J. P.; Darriet, B. (Inst. Gen. Inorg. Chem., Sofia, 1040, Bulg.). International Journal of Hydrogen Energy, 10(9), 591-4 (English) **1985**. CODEN: IJHEDX. ISSN: 0360-3199.
AB In the manuf. of La2-xCaxMg17 (0.1 .ltoreq. x .ltoreq. 1.0), for x = 0.1, single-phase products are synthesized whose x-ray spectrum is identical with that of La2Mg17 [12031-39-9], whereas at x >0.8, the substance obatined is a mixt. of La2Mg17, CaMg2, and **Mg**. At x values of 0.2-0.6, the x-ray spectra of the alloys show, in addn. to the main-phase La2Mg17, weak peaks of an unstable phase of the type Ce5Mg41. The absorption and desorption characteristics towards H of the La18Ca0.2Mg17 and La1.6Ca0.4Mg17 alloys were detd. Under the same **hydriding** conditions, these alloys absorb smaller H amts. that does the pure La2Mg17 alloy, but H desorption from them proceeds with a considerably higher rate than from La2Mg17. The probable causes of these effects are discussed.
CC **52-3** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56
ST calcium lanthanum **magnesium hydrogen storage**
IT Absorbents
(calcium-lanthanum-**magnesium**, for **hydrogen**)
IT Absorption
(of **hydrogen**, by calcium-lanthanum-**magnesium** alloys)

IT Desorption
(of **hydrogen**, by calcium-lanthanum-**magnesium** **hydrides**)
IT Kinetics, reaction
(of **hydrogen**, with calcium-lanthanum-**magnesium** alloys)
IT 12031-39-9 **99640-52-5**
RL: PRP (Properties)
(**hydrogen** absorption by)
IT **1333-74-0**, uses and miscellaneous
RL: USES (Uses)
(storage of, calcium-lanthanum-**magnesium** alloys for)
IT **99640-52-5**
RL: PRP (Properties)
(**hydrogen** absorption by)
RN 99640-52-5 HCA
CN Magnesium alloy, base, Mg 62-63,La 34-37,Ca 1.2-2.5 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	62 - 63	7439-95-4
La	34 - 37	7439-91-0
Ca	1.2 - 2.5	7440-70-2

IT **1333-74-0**, uses and miscellaneous
RL: USES (Uses)
(storage of, calcium-lanthanum-**magnesium** alloys for)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H—H

L86 ANSWER 26 OF 31 HCA COPYRIGHT 2003 ACS on STN
100:88733 **Hydrogen storage** by lanthanum-**magnesium** (La2Mg17) and lanthanum-**magnesium**-nickel (La2Mg16Ni). Shen, Panwen; Wang, Genshi; Zhang, Jizhi; Yang, Xizeng (Nankai Univ., Tianjin, Peop. Rep. China). Jinshu Xuebao, 19(4), A360-A368 (Chinese) **1983** . CODEN: CHSPA4. ISSN: 0412-1961.
AB Two plateaus related to the reactions Mg2Ni + 2H2 .dblarw. Mg2NiH4 and **Mg** + **H2** .dblarw. MgH2 are exhibited in the pressure-compn. isotherm of La2Mg16Ni alloy [**88896-49-5**]. Partial substitution of **Mg** by Ni in La2Mg17 [12031-39-9] gives a 2-phase mixt.: the major La2Mg17 and the minor Mg2Ni phase. **Hydriding** of the La2Mg16Ni alloy leads to the formation of MgH2, La **hydride**, and Mg2NiH4. The H absorption by the alloys under either normal temp. and lower pressure or normal pressure and elevated temp. was also evaluated. Both La2Mg17 and La2Mg16Ni are promising H storage materials.
CC **52-3** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56
ST **hydrogen storage magnesium** alloy; lanthanum nickel **magnesium** alloy **hydrogen**
IT Absorbents
(**magnesium** alloys, for **hydrogen**, properties of)
IT 12031-39-9 **88896-49-5**
RL: PRP (Properties); TEM (Technical or engineered material use); USES

(Uses)
(absorbent for **hydrogen**, properties of)
IT **1333-74-0**, uses and miscellaneous
RL: USES (Uses)
(storage of, absorbent for, properties of)
IT **88896-49-5**
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(absorbent for **hydrogen**, properties of)
RN 88896-49-5 HCA
CN Magnesium alloy, base, Mg 54,La 38,Ni 8.1 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	54	7439-95-4
La	38	7439-91-0
Ni	8.1	7440-02-0

IT **1333-74-0**, uses and miscellaneous
RL: USES (Uses)
(storage of, absorbent for, properties of)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H—H

L86 ANSWER 27 OF 31 HCA COPYRIGHT 2003 ACS on STN
99:143115 Effects of calcium additions on some **magnesium**-alloy **hydrides**. Lupu, D.; Biris, A.; Indrea, E.; Bucur, R. V. (Inst. Isot. Mol. Technol., Cluj-Napoca, R-3400, Rom.). International Journal of Hydrogen Energy, 8(9), 701-3 (English) **1983**. CODEN: IJHEDX. ISSN: 0360-3199.
AB **Hydriding** of CaMg1.8Ni0.5 [87368-99-8] contg. CaMg2 and MgNi2 shows fast activation kinetics. The Mg2Ni phase is obsd. in the dehydrided samples. The 3 plateaus on the H desorption isotherms correspond to the most stable **Mg hydrides** obsd. up to now in **Mg** alloys; the enthalpy change = 20-24 kcal/mol H. Effects of Ca addns. on the H storage capacity and desorption rates of some **Mg**-rich alloys are reported.
CC **52-3** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56, 69
ST calcium **magnesium** nickel alloy **hydrogen**; **storage hydrogen magnesium** alloy
IT Absorbents
(**magnesium** alloys, for **hydrogen**, effect of calcium addn. on properties of)
IT Entropy
(of absorption, of **hydrogen**, by calcium-**magnesium**-nickel alloys)
IT Heat of absorption
(of **hydrogen**, by calcium-**magnesium**-nickel alloys)
IT Absorption
(of **hydrogen**, by **magnesium** alloys)
IT 87368-95-4 87368-96-5 87368-97-6 **87368-98-7** 87368-99-8
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)

(absorbent for **hydrogen**, properties of)
IT **1333-74-0**, uses and miscellaneous
RL: USES (Uses)
(storage of, **magnesium** alloys for, effect of calcium addn. on properties of)
IT **87368-98-7**
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(absorbent for **hydrogen**, properties of)
RN 87368-98-7 HCA
CN Magnesium alloy, base, Mg 43-47,Ca 27-33,La 20-31 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	43 - 47	7439-95-4
Ca	27 - 33	7440-70-2
La	20 - 31	7439-91-0

IT **1333-74-0**, uses and miscellaneous
RL: USES (Uses)
(storage of, **magnesium** alloys for, effect of calcium addn. on properties of)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H—H

L86 ANSWER 28 OF 31 HCA COPYRIGHT 2003 ACS on STN
97:41545 **Magnesium**-alloy **hydrides**. Nachman, J. F.; Rohy, D. A. (Solar Turbines Int., San Diego, CA, 92138, USA). Met.-Hydrogen Syst., Proc. Miami Int. Symp., Meeting Date 1981, 557-600. Editor(s): Veziroglu, T. Nejat. Pergamon: Oxford, UK. (English) **1982**. CODEN: 47RUAA.
AB Progress in the development and characterization of **Mg** and **Mg**-alloy **hydrides** is summarized with emphasis on lightwt. **hydrides** suitable for automotive H fuel-storage applications. The topics covered include: effects of alloy compn. on H capacity, compn.-pressure-temp. relations, **hydriding**-dehydriding kinetics, comminution, and the useful life of **hydrides** when subjected to **hydriding**-dehydriding cycling.
CC **52-3** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56
ST **magnesium** alloy **hydrogen storage**
IT Absorbents
(**magnesium** alloys, for **hydrogen**, properties of)
IT **79771-88-3 79771-89-4 82435-17-4**
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(absorbent for **hydrogen**, properties of)
IT **1333-74-0**, uses and miscellaneous
RL: USES (Uses)
(storage of, **magnesium** alloys for, properties of)
IT **79771-88-3 79771-89-4 82435-17-4**
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(absorbent for **hydrogen**, properties of)

RN 79771-88-3 HCA
CN Magnesium alloy, base, Mg 44,Al 29,Y 27 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	44	7439-95-4
Al	29	7429-90-5
Y	27	7440-65-5

RN 79771-89-4 HCA
CN Magnesium alloy, base, Mg 68,Cu 21,Ni 9.7,Y 1.5 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	68	7439-95-4
Cu	21	7440-50-8
Ni	9.7	7440-02-0
Y	1.5	7440-65-5

RN 82435-17-4 HCA
CN Magnesium alloy, base, Mg 54,La 38,Al 7.5 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	54	7439-95-4
La	38	7439-91-0
Al	7.5	7429-90-5

IT **1333-74-0**, uses and miscellaneous
RL: USES (Uses)
(storage of, **magnesium** alloys for, properties of)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H—H

L86 ANSWER 29 OF 31 HCA COPYRIGHT 2003 ACS on STN
95:206782 Lightweight **hydrides** for automotive **storage** of **hydrogen**. Rohy, D. A.; Nachman, J. F.; Argabright, T. A. (Solar Turbines Int., San Diego, CA, USA). Proceedings of the Intersociety Energy Conversion Engineering Conference, 16th(Vol. 2), 1444-8 (English) **1981**. CODEN: PIECDE. ISSN: 0146-955X.
AB The development of **Mg** alloys for H storage is described and related to the requirements of the automotive spark ignition. The operating constraints of the engine include dissocn. temp., wt., dissocn. rate, cost, and storage d. of the **hydride**. Long-term cyclic tests simulating the refueling cycle were performed to assess the max. allowable impurities in H. The cycling effects on Mg0.845Ni0.05Cu0.1Y0.005 [**79771-89-4**] are reported. The amt. of absorbed H was greatly reduced after .apprx.2000 cycles owing to impurities such as O, N, CO, and H2O (32 ppm) in H.
CC **52-3** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56
ST **magnesium** alloy traction **hydrogen storage**

IT Absorbents
(**magnesium**-base alloys, for **hydrogen**, for traction, properties of lightwt.)
IT **79771-88-3 79771-89-4 79771-90-7**
RL: TEM (Technical or engineered material use); USES (Uses)
(absorbent for **hydrogen**, for traction, properties of lightwt., effect of gaseous impurities on)
IT **1333-74-0**, uses and miscellaneous
RL: USES (Uses)
(storage of, **magnesium**-base alloys for, for traction, properties of lightwt., effects of gaseous impurities on)
IT **79771-88-3 79771-89-4 79771-90-7**
RL: TEM (Technical or engineered material use); USES (Uses)
(absorbent for **hydrogen**, for traction, properties of lightwt., effect of gaseous impurities on)
RN 79771-88-3 HCA
CN Magnesium alloy, base, Mg 44,Al 29,Y 27 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	44	7439-95-4
Al	29	7429-90-5
Y	27	7440-65-5

RN 79771-89-4 HCA
CN Magnesium alloy, base, Mg 68,Cu 21,Ni 9.7,Y 1.5 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	68	7439-95-4
Cu	21	7440-50-8
Ni	9.7	7440-02-0
Y	1.5	7440-65-5

RN 79771-90-7 HCA
CN Magnesium alloy, base, Mg 54,La 39,Al 7.5 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	54	7439-95-4
La	39	7439-91-0
Al	7.5	7429-90-5

IT **1333-74-0**, uses and miscellaneous
RL: USES (Uses)
(storage of, **magnesium**-base alloys for, for traction, properties of lightwt., effects of gaseous impurities on)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H—H

L86 ANSWER 30 OF 31 HCA COPYRIGHT 2003 ACS on STN
93:153188 Storage and use of **hydrogen**, especially in motors. Pezat, Michel; Darriet, Bernard; Hbika, Abdelmalek; Hagenmuller, Paul (Agence

Nationale de Valorisation de la Recherche, Fr.). Eur. Pat. Appl. EP 7840
19800206, 25 pp. (French). CODEN: EPXXDW. APPLICATION: EP
1979-400470 19790706.

AB **Hydrides** of **Mg** alloys decomp. at low temp. and can be used in the self-starting internal-combustion engines for supplying H. Thus, 90% H was released by the thermal decompn. of 1:12 CeH3-MgH2 mixt. by heat of exhaust gases of the H-fueled engine. The **hydride** mixt. was obtained by heating CeMg12 [12014-67-4] at 325.degree. and 30 atm H.

IC C22C023-06; F17C011-00

CC **52-3** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56

ST **hydrogen storage magnesium** cerium compd

IT Absorbents
(**magnesium** alloys, for **hydrogen**, for internal-combustion engines)

IT 12014-67-4 74978-56-6 75030-27-2 **75044-04-1**
RL: TEM (Technical or engineered material use); USES (Uses)
(absorbents for **hydrogen**, for internal-combustion engines)

IT **1333-74-0**, uses and miscellaneous
RL: USES (Uses)
(storage of, **magnesium** alloys for, for internal-combustion engines)

IT **75044-04-1**
RL: TEM (Technical or engineered material use); USES (Uses)
(absorbents for **hydrogen**, for internal-combustion engines)

RN 75044-04-1 HCA

CN Magnesium alloy, base, Mg 61,La 37,Sr 2.6 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	61	7439-95-4
La	37	7439-91-0
Sr	2.6	7440-24-6

IT **1333-74-0**, uses and miscellaneous
RL: USES (Uses)
(storage of, **magnesium** alloys for, for internal-combustion engines)

RN 1333-74-0 HCA

CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H—H

L86 ANSWER 31 OF 31 HCA COPYRIGHT 2003 ACS on STN

90:207180 The storage and release of **hydrogen** from **magnesium** alloy **hydrides** for vehicular applications. Douglass, David L. (Mater. Dep., Univ. California, Los Angeles, CA, USA). Hydrides Energy Storage, Proc. Int. Symp., Meeting Date 1977, 151-84. Editor(s): Andresen, A. F.; Maeland, A. J. Pergamon: Oxford, Engl. (English) **1978**. CODEN: 40AOAU.

AB Dil. solid solns. of **Mg** with 1 at.% Ag, Al, Cd, In, Pb, Y, or Zn (-25 +42 mesh chips) were **hydrided** at 400.degree. to 800.degree. psi H. Two-phase binary and ternary alloys were also investigated. The solid-soln. alloys contg. Ag, Al, In, and Y exhibited the most rapid **hydriding** kinetics, .apprx.5-6 wt.% in 24 h (theor. for 100% MgH2

is 7.6 wt.%). Dehydriding at 300 and 330.degree. was most rapid for **Mg**-1Y [70295-77-1], followed in order by **Mg**-1Al [70295-78-2], **Mg**-1Ag [70295-79-3] and **Mg**-1 at.% In [70295-80-6]. Only the **Mg**-1 at.% Y appeared promising at 300.degree.. **Mg**-5 at.%Y [70295-81-7] was subjected to numerous **hydriding** and dehydriding cycles in a closed system. It released .apprx.3% H in 6 h at 270.degree.. The best alloy studied was **Mg** -5 Ni-5 at.% Y [**70295-82-8**] which released >3% H in 4 h at 250.degree.. This alloy came the closest to fulfilling the program objectives and is a viable storage medium for vehicular applications.

CC **52-3** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56, 67

ST **hydrogen storage magnesium** alloy; yttrium **magnesium hydrogen storage**; nickel yttrium **magnesium hydrogen storage**

IT Absorbents
(**magnesium** alloys, for **hydrogen**, properties of, for traction)

IT 62699-60-9 70295-64-6 70295-65-7 70295-66-8 70295-67-9
70295-68-0 70295-69-1 70295-70-4 70295-71-5 70295-72-6
70295-73-7
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(absorbent for **hydrogen**, properties of, for traction)

IT **70295-74-8** **70295-75-9** 70295-76-0 70295-77-1
70295-78-2 70295-79-3 70295-80-6 70295-81-7 **70295-82-8**
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(absorbents for **hydrogen**, properties of, for traction)

IT **1333-74-0**, uses and miscellaneous
RL: USES (Uses)
(storage of, **magnesium** alloys for, properties of, for traction)

IT **70295-74-8** **70295-75-9** **70295-82-8**
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(absorbents for **hydrogen**, properties of, for traction)

RN 70295-74-8 HCA
CN Magnesium alloy, base, Mg 79,Y 16,Al 4.9 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	79	7439-95-4
Y	16	7440-65-5
Al	4.9	7429-90-5

RN 70295-75-9 HCA
CN Magnesium alloy, base, Mg 92,Ag 4.2,Y 3.4 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	92	7439-95-4
Ag	4.2	7440-22-4
Y	3.4	7440-65-5

RN 70295-82-8 HCA
CN Magnesium alloy, base, Mg 75,Y 15,Ni 10 (9CI) (CA INDEX NAME)

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Component   Component      Component
             Percent    Registry Number
=========+=============+===============
    Mg         75          7439-95-4
    Y          15          7440-65-5
    Ni         10          7440-02-0
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IT **1333-74-0**, uses and miscellaneous
RL: USES (Uses)
(storage of, **magnesium** alloys for, properties of, for traction)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H— H

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L87 ANSWER 1 OF 2 HCA COPYRIGHT 2003 ACS on STN
137:356534 Magnesium alloys for **hydrogen storage**. Osawa, Masato; Tomioka, Hidenori; Terashita, Naokatsu; Hayami, Noboru; Tsunokake, Shigeru (Nippon Jukagaku Kogyo Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2002327230 A2 20021115, 7 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2001-128555 20010426.
AB The alloys comprise metal Mg and a Mg-contg. intermetallic compd. MgxMy (e.g., M = Al, Si, Ca, Co, Ni, Cu, Sr, Y, **Pd**, Sn, Ba, and/or Ln) and contain .gtoreq.60% of total Mg. In solidification of the alloys, the intermetallic compd. is crystd. first. The alloys can absorb and release large amt. of H under low-temp. and low-pressure conditions.
IC ICM C22C023-00
CC 56-3 (Nonferrous Metals and Alloys)
ST magnesium **hydrogen storage** alloy intermetallic compd; initial activation magnesium **hydrogen** absorbing alloy
IT Crystal structure
(contg. initially crystd. Mg-contg. intermetallic compd.; magnesium alloys for **hydrogen storage**)
IT Intermetallic alloys
RL: MSC (Miscellaneous)
(magnesium alloys for **hydrogen storage**)
IT **1333-74-0, Hydrogen**, miscellaneous
RL: MSC (Miscellaneous)
(magnesium alloys for **hydrogen storage**)
IT 60501-13-5 94702-97-3 116742-98-4 119469-84-0 125168-68-5
166898-13-1 407629-94-1 474758-43-5 **474758-44-6**
474758-45-7 **474758-46-8** 474758-47-9 **474758-48-0**
RL: TEM (Technical or engineered material use); USES (Uses)
(magnesium alloys for **hydrogen storage**)
IT **1333-74-0, Hydrogen**, miscellaneous
RL: MSC (Miscellaneous)
(magnesium alloys for **hydrogen storage**)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H— H

IT **474758-44-6 474758-46-8 474758-48-0**
RL: TEM (Technical or engineered material use); USES (Uses)
(magnesium alloys for **hydrogen storage**)
RN 474758-44-6 HCA
CN Magnesium alloy, base, Mg 70,Y 30 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	70	7439-95-4
Y	30	7440-65-5

RN 474758-46-8 HCA
CN Magnesium alloy, base, Mg 70,La 30 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	70	7439-95-4
La	30	7439-91-0

RN 474758-48-0 HCA
CN Magnesium alloy, base, Mg 70,Ca 10,La 10,Ni 10 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	70	7439-95-4
Ca	10	7440-70-2
La	10	7439-91-0
Ni	10	7440-02-0

L87 ANSWER 2 OF 2 HCA COPYRIGHT 2003 ACS on STN
137:281787 Thermal stabilities and discharge capacities of melt-spun Mg-Ni-based amorphous alloys. Yamaura, Shin-Ichi; Kim, Hyang-Yeon; Kimura, Hisamichi; Inoue, Akihisa; Arata, Yoshiaki (Institute for Materials Research, Tohoku University, Sendai, 980-8577, Japan). Journal of Alloys and Compounds, 339(1-2), 230-235 (English) 2002. CODEN: JALCEU. ISSN: 0925-8388. Publisher: Elsevier Science B.V..

AB Mg-Ni-M (M=Ca, La or **Pd**) ternary alloys were synthesized by the melt-spinning technique. All as-solidified alloys possessed an amorphous single phase by the addnl. effect of the third element, though it was difficult to obtain an amorphous Mg67Ni33 binary alloy by melt-spinning. We examd. the thermal stability and electrochem. cyclic life property of the ternary amorphous alloys. The crystn. temp. of the amorphous alloys increases with increasing M content. All the alloys except Mg67Ni28Pd5 examd. in the present study maintain the amorphous structure even after **hydrogen** absorption at 373 K for Mg-Ni-Ca and Mg-Ni-**Pd** and at 423 K for Mg-Ni-La. The crystn. temp. increases by absorbing **hydrogen**, indicating that the alloys are thermally stabilized by **hydrogen** absorption. In the electrochem. cyclic life measurements up to five cycles, the Mg-Ni-**Pd** amorphous alloys exhibit high discharge capacities ranging from 100 to 400 mA h/g as well as small cyclic life degrdn. tendency, though the Mg-Ni-Ca and Mg-Ni-La amorphous alloys possess small discharge capacities of 10-100 mA h/g with significant cyclic life degrdn. The good cyclic life property of the amorphous **hydrogen storage** alloys can be obtained by application of the melt-spinning technique to Mg-based alloys with appropriate alloy compns.

CC 52-3 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **hydrogen storage** magnesium nickel based amorphous alloys
IT **Storage**
(of **hydrogen**; thermal stabilities and discharge capacities of melt-spun Mg-Ni-based amorphous alloys)
IT **1333-74-0, Hydrogen**, processes
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(**storage**; thermal stabilities and discharge capacities of melt-spun Mg-Ni-based amorphous alloys)
IT 193979-12-3 321989-40-6 358977-24-9 466696-95-7 **466696-96-8** **466696-97-9** **466696-98-0** 466696-99-1 466697-00-7
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(thermal stabilities and discharge capacities of melt-spun Mg-Ni-based amorphous alloys)
IT **1333-74-0, Hydrogen**, processes
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(**storage**; thermal stabilities and discharge capacities of melt-spun Mg-Ni-based amorphous alloys)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H—H

IT **466696-96-8 466696-97-9 466696-98-0**
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(thermal stabilities and discharge capacities of melt-spun Mg-Ni-based amorphous alloys)
RN 466696-96-8 HCA
CN Nickel alloy, base, Ni 47,Mg 36,La 17 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ni	47	7440-02-0
Mg	36	7439-95-4
La	17	7439-91-0

RN 466696-97-9 HCA
CN Nickel alloy, base, Ni 41,La 29,Mg 29 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ni	41	7440-02-0
La	29	7439-91-0
Mg	29	7439-95-4

RN 466696-98-0 HCA
CN Lanthanum alloy, base, La 39,Ni 37,Mg 24 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
La	39	7439-91-0

Ni	37	7440-02-0
Mg	24	7439-95-4